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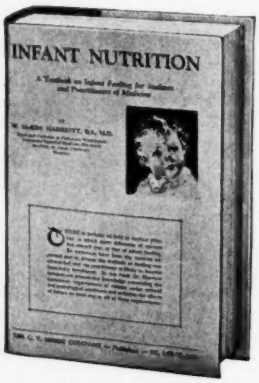

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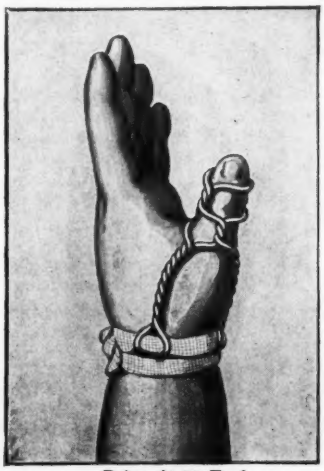

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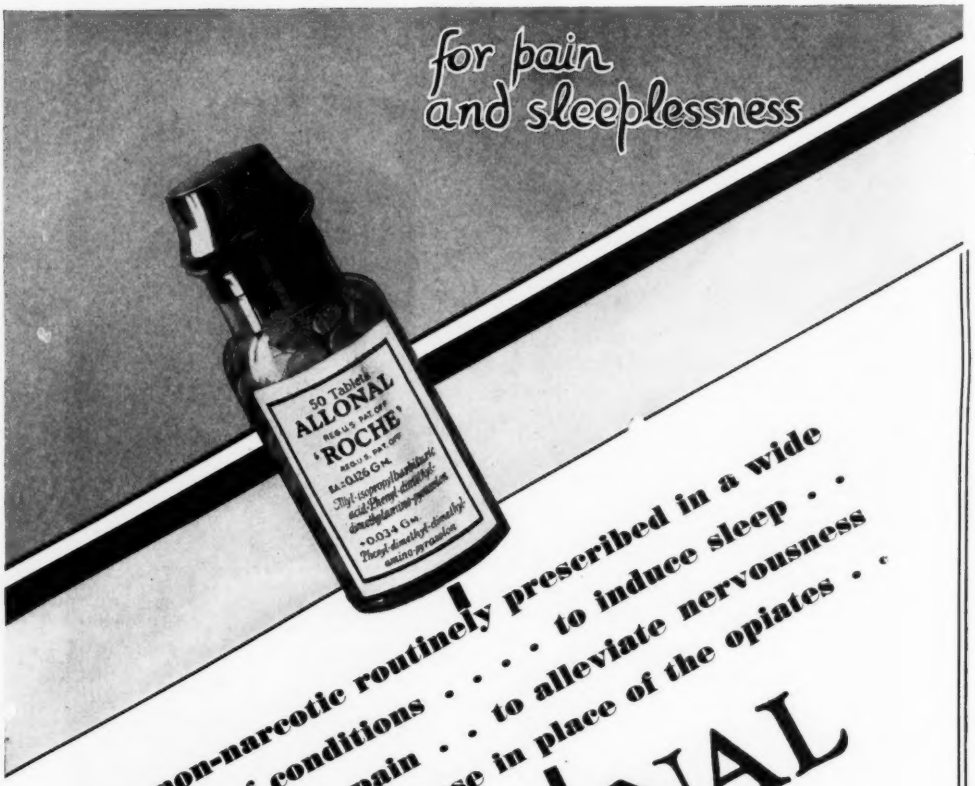

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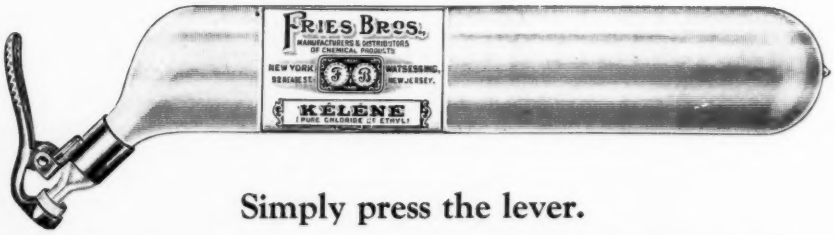

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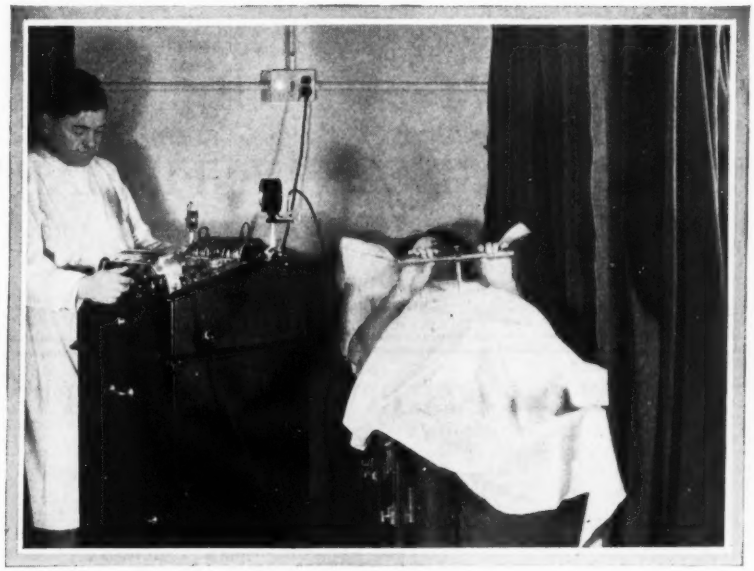

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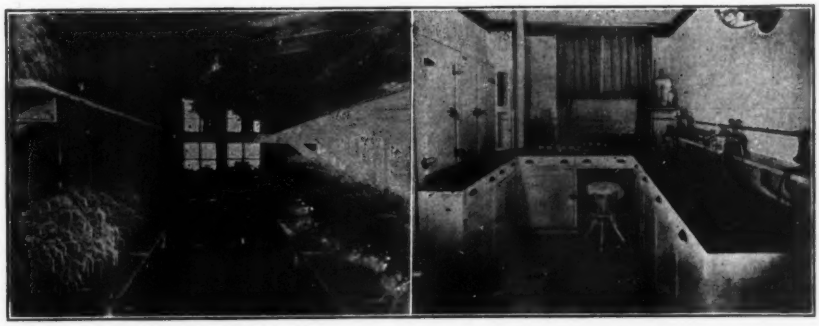

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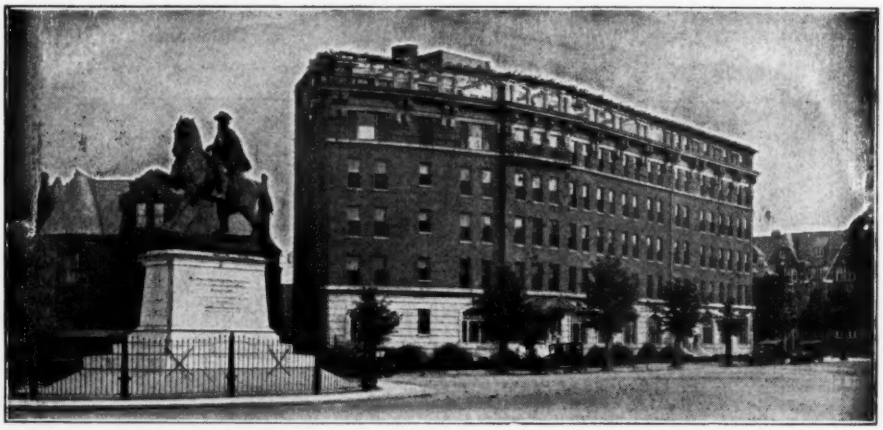

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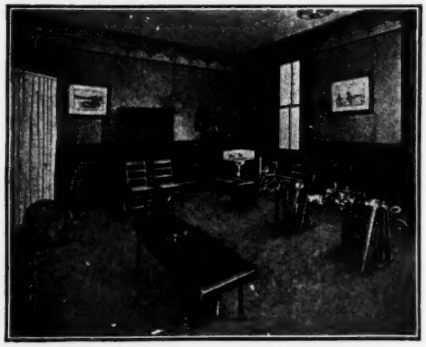

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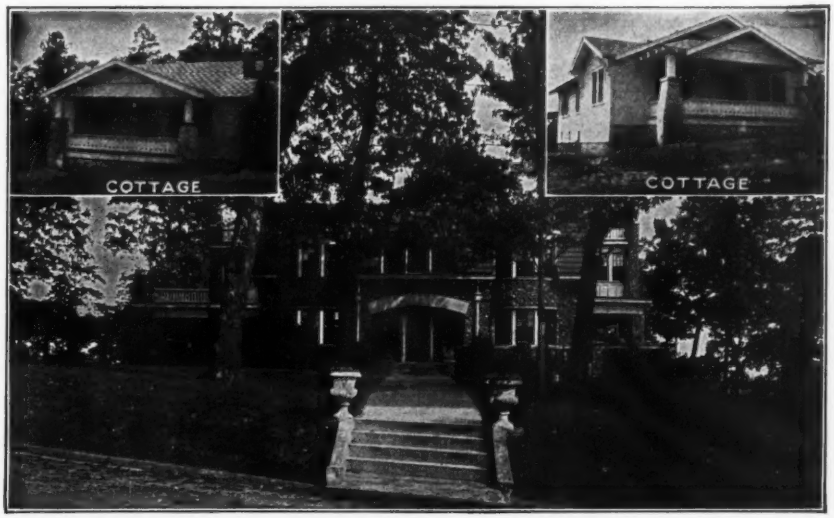

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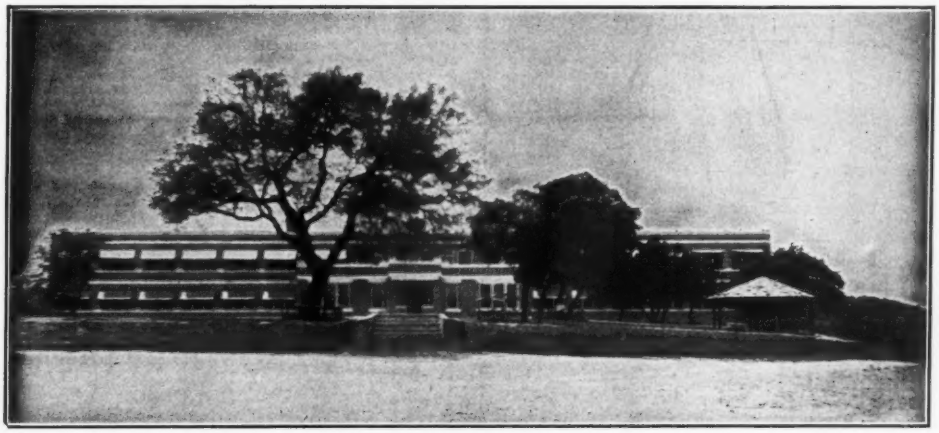

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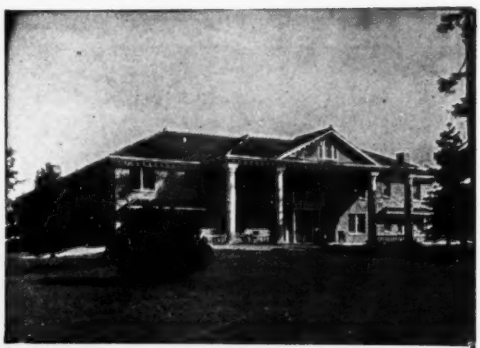

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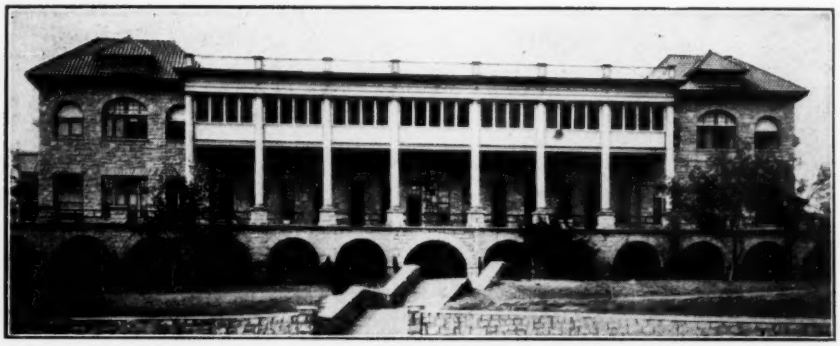

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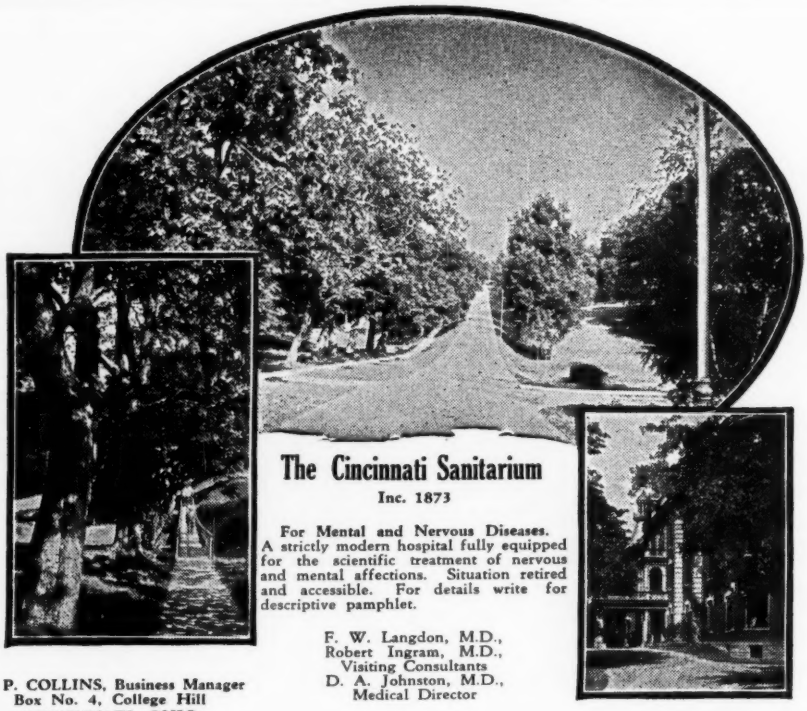

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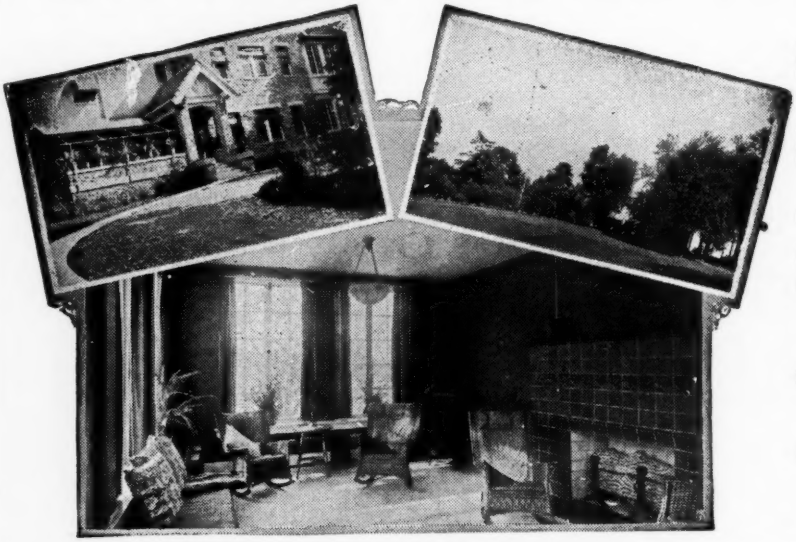

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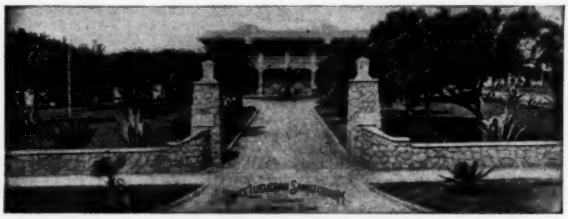

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FOODS IN THE SOLUTION OF THE GOITER PROBLEM*

By WILLIAM WESTON, M.D.,
Columbia, S. C.

Iodine deficiency in its organic relation is probably America's foremost public health problem.

The United States Public Health Service places two-thirds of the United States in the goiter area. No surveys, or only fragmentary ones, have been made in Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Texas, Oklahoma and New Mexico. Of the Southern states North Carolina, Virginia and West Virginia have been placed in the goiter area. In South Carolina a full and complete survey has been made by the South Carolina Board of Health and this has been checked by the Federal authorities.

Goiter is a problem of major importance in the Pacific Coast states, including a large portion of California, in the region about the Great Lakes and the St. Lawrence River, the states in the Central Basin, the Appalachian Mountain region and the Rocky Mountain states.

Figures compiled by the United States Public Health Service show that the goiter incidence is high and is a serious problem in large sections of the following states: California, Connecticut, Colorado, Kansas, Kentucky, Illinois, Indiana, Michigan, Louisiana, Massachusetts, Missouri, Montana, Maine, New York, Minnesota, Maryland, Ohio, North Dakota, South Dakota, Oregon, Pennsylvania, Utah, Virginia, West Virginia, Washington and Wyoming.

Dr. John M. Blackford of Seattle writes as follows: "I had, a few years ago, opportunity to study the girls of a freshman university class; 85 per cent had definitely larger thyroids than is strictly normal, and a survey would probably show an equally high incidence of adolescent goiter."

*Read in Section on Pediatrics, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

GOITER IN HIGH SCHOOL GIRLS

(After McClendon, Physiol. Rev., 1927)

	Per Cent Goiterous
Michigan	
Houghton County	71
Wexford County	56
Midland County	33
Malcolm County	26
Grand Rapids—Kent County	40
Minnesota	
St. Paul	73
Average of 13 towns	71
Montana	
Fergus County	49
Carbon	39
Cascade	34
Big Horn	25
Hill	13
Ohio	
Cincinnati	40
Colorado	40
Utah	54
Kansas	
Topeka	50
Connecticut	
Average	29
Manitoba	43-79

Dr. J. Tate Mason, of Seattle, writes: "The diagnosis and treatment of goiter are problems of this Northwest country. In the city of Seattle it has been estimated that 65 per cent of the boys and 75 per cent of the girls between the ages of 12 and 18 have some disturbance of the thyroid gland."

Smith, writing in 1917 of the conditions in the Yellowstone River Valley, says, "There is a loss of approximately one million young pigs and numerous lambs, calves and colts each year as a result of thyroid diseases." He describes the pigs as either being hairless and born dead or having died within an hour or two, while others lived from 24 to 36 hours.

Keith's account of conditions due to iodine deficiency in the Pemberton Valley in British Columbia are interesting. He writes: "Many of the women and every child born in this district had an enlarged thyroid. Pigs were born hairless, calves were goiterous, mares became goiterous and many colts carried beyond full term and showed traces of myxedema. Many of the eggs of fowls, while fertile, failed to hatch, the apparent reason being thickening of the white envelope within the shell."

SYNOPSIS OF DATES AND EVENTS IN THE DEVELOPMENT OF THE GOITER PROBLEM

1811. Iodine was discovered by Courtois, a saltpeter manufacturer of Paris.

1813. The element discovered by Courtois

was given the name of iodine by Gay-Lussac and Sir Humphrey Davy.

1820. Coindet, a physician of Geneva, first deliberately used iodine in the treatment of goiter.

1852. Chatin directed attention to the observation that goiter was more common in those regions where the soils and waters were very low in iodine.

1874. Sir William Gull showed that the thyroid gland underwent extreme atrophy in cases of myxedema. From this discovery was learned the function of the thyroid gland.

1882. Reverdin Brothers reported a symptom complex similar to myxedema following the surgical removal of the thyroid gland in man.

1895. Magnus-Levy discovered that metabolism (heat production) was markedly decreased in myxedema. Following this discovery it was learned that heat production is decidedly lowered by removal of the thyroid gland.

1895. Baumann discovered relatively large amounts of iodine in the thyroid gland and found that no other tissue in the body contained iodine in comparable amounts. This discovery has proved to be the greatest advance yet made in unraveling the physiology and pathology of the thyroid. It at once aroused great interest which resulted within ten years in showing that iodine was the determining element in the specific secretion of the thyroid which caused its most characteristic effect, namely, increased metabolism (heat production), and its absence caused decreased heat production.

1897. Magnus-Levy showed that the beneficial effect of the administration of thyroid gland was in raising the level of heat production.

1909 to 1910. Marine and Lenhart first intentionally used iodine for the prevention of goiter in large groups of girls.

1910. Marine and Lenhart introduced iodine in water, thus preventing goiter in brook trout.

1916. E. C. Kendall, of Rochester, Minnesota, isolated from thyroid glands a specific iodine-containing crystalline substance which he named thyroxin. This hormone contained 65 per cent of pure iodine.

1922 to 1927. McClendon, of the University of Minnesota, published a series of articles which were largely responsible for crystallizing the relation between the deficiency of iodine in the food supply and the incidence of goiter. After reading these articles one will inevitably be led to the conclusion that the logical course to pursue in the prevention and treatment of goiter is to eat foods that naturally contain a sufficient amount of iodine to provide for nutritional requirements.

1928 to 1929. Remington examined in the South Carolina Food Research Laboratory great numbers of samples of vegetables grown in all sections of South Carolina for their iodine content. He found the amounts of iodine in them enormously greater than those reported by other workers in vegetables from Northern and Western states. This discovery in conjunction with the goiter survey made by the field force of the South Carolina State Board of Health in which it was found that goiter was practically non-existent would lead to the conclusion that goiter will not occur if foods that naturally contain a sufficient amount of iodine are regularly eaten.

1929. Marine in a series of experiments discovered that on a diet of boiled cabbage rabbits quickly became goiterous, but when fed the same cabbage raw they remained free from goiter. These experiments emphasize the importance of maintaining the organic relationship of iodine.

FUNCTIONS OF THE THYROID GLAND

Dr. Remington in a recent address explained the functions of the thyroid gland as follows:

"Translated into popular language, our picture of the thyroid gland is that of a chemical factory which requires as raw materials substances derived from the protein of our food, and iodine. Unlike an industrial plant, which shuts down if raw material is lacking, the gland in cases of iodine deficiency starts to enlarge, apparently in the attempt to collect more iodine from the blood which supplies it. This enlargement we call simple goiter. The finished product of this factory is a substance named thyroxin, which is delivered to the blood, carried by the blood to the most remote parts of the body and acts (to use a familiar term) as a timer for the fundamental activities of the body. If too little of the timer substance is produced, the body machine runs slow. Mental and physical processes are less active, body temperature and pulse rate are apt to be lowered, the subject lays on fat, and in extreme cases the skin becomes thickened, dry and rough, the eye loses its luster, a condition of myxedema.

"The opposite picture is that of a factory whose output of the timer substance is greater than it should be, so that all those effects are reversed. There are more rapid respiration and pulse, higher body temperature, a tendency to lose weight, increased mental and physical activity, etc. This is the condition in the so-called toxic type of goiter, which can be relieved only by cutting out part of the gland to reduce it to somewhere near its normal size. This extra active gland is supposed by

most investigators to follow after the simple goiter. A lack of iodine causes the gland to enlarge and the enlarged gland later to become too active."

DISEASES OF THE THYROID GLAND

The diseases associated with disturbances of the function of the thyroid gland may for convenience be divided into two groups.

The first group includes simple goiter, cretinism and myxedema. These are definitely due to a deficiency of iodine in the diet. Simple goiter is the most frequently met of all the varieties. Its sudden occurrence in large numbers of cases in military garrisons, institutions, schools and in certain districts has given the impression of an infection, but further investigation developed the true causes, namely, "deficiency of iodine in the diet." These sudden and acute outbreaks have occurred in dairy herds, on poultry farms and in fish hatcheries in districts where the ordinary incidence of goiter was high and occasionally where it was low.

The periods of life when goiter most frequently develops are: during fetal life, puberty, pregnancy and lactation and the menopause. These are the periods of life when growth, differentiation and energy transformation are greatest. Goiter is about three times more common in girls than boys except in districts where the greater portion of the population have goiters. It is also true that the need for iodine in the diet is increased in certain infections, such as tuberculosis, syphilis, tonsillitis and focal infections.

CRETINISM

Cretinism is a condition due to retarded development, resulting in dwarfism, and is invariably associated with mental defectiveness and changes in the thyroid gland, bones, skin, genitals and organs of special senses. It is found almost exclusively in regions where goiter is very common.

Cretins are usually the children of parents, one or both of whom have goiters. It is much more common in females than in males. When two cretins marry the marriage is invariably sterile or if they have children they do not survive. It is not unusual for cretins to have goiter.

A cretin presents the following characteristics: stout, rather bulky, quadrangular head, broad face, conspicuous nostrils, prominent cheek bones, prognathous chin. The mouth appears large, the lips are thick, the tongue is large and often protrudes from the partly open mouth. The neck is short and thick and over 60 per cent have a goiter. The body is short and broad, the thorax is short and fat, and the abdomen is large and pendulous (pot-bellied). The legs are short and plump. Cretins walk with a waddling, uncertain gait. All their movements are slow and clumsy.

The skin of the cretin is of a chalky pallor and areas of brown pigmentation are often present. It feels cold to the touch, and is thick, unelastic and flabby. It is often wrinkled over the forehead, hangs in folds, especially around the hips, and appears edematous, yet does not pit on pressure. The skin is usually dry and scaly. The hair is scanty, coarse and dry; the nails are brittle, the teeth are invariably decayed.

Practically all the secondary sex characteristics remain undeveloped.

Cretins are huge eaters, but seldom chew their food. All cretins are low grade mentally; many of them are imbeciles or idiots. Many of them are deaf. It is not unusual for cretins to become beggars or criminals.

In goiterous districts it is not unusual to find borderline cases. These individuals are small of stature, mentally dull, clumsy in their movements and lazy.

Deaf-mutes are very numerous in cretinous regions and a large proportion of them have goiter.

Emerson writes:

"The cretins present a very serious economic and social problem in goiter countries, since so large a proportion of the population is physically and mentally below average and so a positive burden for the state to bear."

MYXEDEMA

Myxedema is a chronic disease characterized by changes in the skin and subcutaneous tissue and by general ill health and mental disturbances, all due to a loss of thyroid function. These cases, like cretins, are found in goiterous districts where the food supply does not contain a sufficient amount of iodine to provide for nutritional requirements.

The most important symptoms are mental apathy and changes in the skin. These changes develop slowly, from weeks to years passing before the complete picture is produced.

"The first notable symptoms are sometimes mental, sometimes in the skin. There is in some cases a frequent constant malaise, with lapses of memory and other physical anomalies. In others swelling of the eyelids, dryness and yellowness of the skin, solid edema or the gait may first attract attention."

The thickening of the skin is usually first noted in the face, especially the eyelids, or in the chin, ears, cheeks and neck. The swelling does not pit on pressure. The hands, feet, arms and legs become enlarged. The fingers become thick and clumsy. The abdomen is large and pendulous. The hair becomes dry, coarse and brittle and falls out. Weakness and loss of memory are usually present and all the mental processes are slow. Indecision is marked. Hallucinations of sight and hearing sometimes occur. Delusions of seeing animals may be present. Changes take place in the speech. It is slow, and changes in the voice occur. Changes in the organs of special sense are not infrequent. Appetite is poor and thirst is seldom experienced.

In 1926 the writer reported to the authorities of South Carolina that after careful observation he was convinced that goiter was practically nonexistent in South Carolina and the natural inference was that the fruits and vegetables locally grown contain a high percentage of iodine. These observations resulted in the establishment by the state of a thoroughly equipped and scientifically conducted food research laboratory under the supervision of a commission composed of the President of the University of South Carolina, the President of Clemson College, the Dean of the Medical College of the State of South Carolina, the State Health Officer; Dr. R. R. Walker and myself. After several months of careful consideration and investigation Dr. Roe E. Remington, of Minnesota, was unanimously elected director and the laboratory was located in connection with the Medical College of the State of South Carolina. This decision was made because we felt it was important that the work contemplated be done in connection with well equipped physiological and pathological laboratories and not, as is usually the practice, in an agricultural college where these important facilities are not available.

It was and is our purpose to make complete chemical analyses of all foods grown or produced in South Carolina which are used in human or animal diets and the relationship of the elements to each other in the process of nutrition.

Our work had not advanced very far when it was discovered that the fruits and vegetables grown in South Carolina contain enormous amounts of iodine. It was therefore decided to study this problem carefully. With this object in view, we have done a great number of analyses, mainly of vegetables, to determine their iodine, manganese, iron and copper content. We have found an interesting correspondence between manganese, iron and iodine, all being more abundant in the vegetables grown in South Carolina than in those reported from California and other Western and Northern states. There is no material difference in the amount of copper found. Professor Shiver, who has done considerable work in the determination of these elements, feels that there is a certain correlation between iodine, iron, manganese and copper and a possibility that they may be interdependent in their nutritional functions as are manganese and iron or copper and iron. We have considerable evidence that they are associated with vitamins A and B. There is an abundance of evidence available to prove that they are indispensable in the regeneration of hemoglobin.

Our investigations show that the green leafy vegetables are by far the best sources of all these elements. For instance, we have found a maximum of parts per billion, dry basis:

	Iodine	Copper	Manganese	Iron
Lettuce	2967	11.01	133.27	2110 (average)
Spinach	1178.5	12.33	172.64	1750
Beet tops	657	13.48	182.96	not available
Root Vegetables:				
Carrots	466	10.17	48.95	765
Turnips	588.5	4.40	13.53	not available
Stalks, Bush and Vine Fruits:				
Asparagus	574.5	14.66	37.28	690
Tomatoes	166.5	17.02	27.15	185
Squash	1018	12.48	23.00	130
Tubers:				
Irish potatoes	254.5	6.57	10.27	390
Sweet potatoes	266	5.72	10.38	88

It will be seen from these figures that the tomato is destined to play an important role in the science of nutrition and analyses show that both turnip tops and cabbage as representatives of the green leafy vegetables are poor sources of copper and manganese, but are good sources of iodine.

From the standpoint of the pediatrician and his part in helping to solve the goiter problem the study of milk offers the most important field for research. We have been working on milk produced in South Carolina for nearly a year and while the work is far from complete we have accumulated sufficient information to account for some of the effects usually attributed to a milk diet. If milk produced in the other Southern states contains as much iodine, iron and manganese as does the milk produced in South Carolina, from cattle fed or grazed on native foods we can see no reason why there should be such a condition as is described as milk anemia. We have compared our milk with that produced in Wisconsin, Michigan and some of the other

prominent dairying states and we find the difference in regard to the iodine, iron and manganese contents most surprising. I am not at liberty at this time to give the data in regard to iron and manganese as they will shortly appear in one of the scientific journals, but I shall merely announce that milk produced in South Carolina from cattle fed on native foods runs about one thousand parts per billion of iodine as against less than one hundred parts for the Mid-Western states.

SUMMARY

It is our opinion that the solution of the goiter problem will be accomplished through a food supply that is rich in iodine, iron, manganese and copper and perhaps other important mineral elements upon which a sufficient study has not been made to base an opinion. Since goiter does not exist in either animals or human beings where fruits, vegetables and milk are rich in these elements, we conclude that if the daily ration is composed of such foods, and if during such conditions as gestation, lactation and menstruation a relatively larger amount than usual is consumed, goiter will no longer be a problem.

DISCUSSION (*Abstract*)

Dr. D. Lesesne Smith, Spartanburg, S. C.—We might say that this subject is in its infancy; or at least we might say it is an infant subject, with Dr. Weston as father of the subject and Dr. Remington as mother. Dr. Weston has thought, breathed, lived, and talked this subject incessantly. He predicted the value of South Carolina vegetables six years ago, but he was unable to persuade the authorities in the State to allow him to carry out his experiments. Dr. Remington has the largest laboratory in the world today, as I understand, of this character. He has been checked by various scientists who have been brought there to observe his work, and they have not been able to find any fault with his figures or his technic. Therefore we must believe that his figures are correct.

We should withhold any criticism until we can prove that these statistics are wrong and the facts are not facts. I should like to see a detailed study made; and, as Dr. Weston says South Carolina contains less goiter than any other section, I think it would be a good plan to make a detailed and intimate study of each subject of goiter in South Carolina, to ascertain whether these patients are eating South Carolina vegetables, or whether they are eating canned vegetables from our Western states.

It will be a blessing to humanity if we can reach this problem through these studies.

Dr. L. von Meysenbug, New Orleans, La.—In our part of the country, that is in Louisiana and along the Gulf Coast, we see so little of goiter that we have rather lost contact with the subject. I have jotted down some observations that were gleaned from reading a few articles on this subject that struck me as being significant. The first fact is that the use of thyroid gland preparations dates back to antiquity. They were used over four thousand years ago by the Chinese. At that time, also, there was mention of burned sponges and seaweed in the diet.

Proximity to the seacoast is thought to protect the inhabitants of seacoast towns from goiter. Apparently in South Carolina, however, the farther away you get from the sea, the higher the iodine content of the vegetables is found to be. In the Puget Sound district of Washington and in Seattle there is considerable goiter, but if you get out on San Juan Island, in the sound itself, you find no goiter among the school children.

One observation reported by two men in Akron, Ohio, where the school children were given sodium iodide, is that of 2,190 school girls given iodine twice a year for two years only five developed goiter, whereas in the control group of 2,200, 495 developed goiter. In Switzerland the use of iodine is under government control; the government dispenses it, and it is said that the incidence of goiter in school children has decreased very much. One report shows that the incidence of goiter in school children was reduced from 90 to 28 per cent in five months' time by giving these children 15 grams of iodine per week.

Dr. Alan Brown, Toronto, Ca.—I consider this paper to be one of the most important contributions to medicine.

We see a great deal of goiter in children in our part of the country, and I was just wondering if we could possibly open up some negotiations with Dr. Weston and the provincial government to get some vegetables from South Carolina.

Another very interesting observation, I thought, was in connection with the iron content of cow's milk. A condition that is very prevalent with us is alimentary anemia or milk anemia, not only among the babies that are artificially fed but also among babies that are breast fed; and I thought Dr. Weston's observation regarding the iron and manganese content very pertinent to that condition.

Dr. John A. Foote, Washington, D. C.—I have known of Dr. Weston's interest in this subject for a good while, and I have felt that something might come of it, but I am free to confess that I did not think that such a convincing result could be obtained. It throws a very practical light on some of the goiter problems. I am quite sure that the far-seeing and energetic state of South Carolina will not allow this thing to go unnoticed and that it will find means to offer the less privileged parts of the Country some of these vegetables.

Dr. Weston (*closing*).—I wish to mention two series of observations which I think may be of interest to the meeting. I took one group of children and fed them on American dry milk. I took another group of the same number, and fed them on English dried milk, a brand called Cow and Gate. At the end of several months (I will report this more in detail in another article) there were these differences: Those fed on the English milk had an advantage of 30 per cent of hemoglobin in the blood; they had outgrown and out-developed those fed on the American milk, and all those fed on the American milk showed symptoms of rickets. Subsequently I had the two milks examined. The English brand was high in iodine, manganese, iron, and had a considerable trace of copper; while in the American milk we could find no iodine whatever, only a small amount of iron and manganese, and apparently no copper.

The next experiment was on a number of mothers who came to my office, thirty-six in number, who showed some manifestations of goiter. The babies in most instances were breast fed and were anemic. I gave those mothers each day certain vegetables that I knew to be very high in iodine, manganese, iron, and copper. Within six months, with the test used by Olsen, we could not detect any goiter whatsoever, and the babies' hemoglobin had considerably improved.

Now, do not fool yourselves that this manifestation of a food deficiency, goiter, is due solely to an iodine deficiency. It is not. A proper combination of iodine, manganese, iron and copper are needed to prevent it.

REDUCTION OF MORTALITY OF BRAIN ABSCESS BY SIMPLE METHODS OF TREATMENT*

By C. C. Coleman, M.D.,
Richmond, Va.

Accuracy requires that any statistical report dealing with results of treatment of brain abscess should clearly specify the type of abscess treated. To discuss the various forms of localized intracranial suppuration without stating the etiological factors, the presence or absence of encapsulation, the type of infection or the location and number of abscesses is not productive of scientific conclusions.

It is well known that septic encephalitis with formation of small abscesses, regardless of treatment, is practically always fatal. It is also recognized that metastatic abscesses, because of the serious systemic infection preceding their development, as well as the multiplicity of the lesions, rarely yield to surgical treatment.

Abscesses from a gunshot wound have a high mortality because of the type of abscess produced and the frequency of retained foreign bodies.

The discussion of this paper is limited entirely to the treatment of chronic, subcortical, solitary abscesses, usually produced by an infection of the accessory sinuses. From the recent reports in the literature there has been great improvement in the results of the treatment of brain abscess, although the mortality continues to be very high. In 1922, Eagleton reported a 75 per cent mortality, but stated that his results had greatly improved in the last cases of the series. In 1929, Dench (*Laryngoscope*, May, 1929) reported 21 cases of cerebral abscess with nine recoveries. Of the six cerebellar abscesses in the same series, two recovered. Korner was quoted by Dench at this time as having had 29 recoveries in a series of 55 cases. More recently Cahill reported twelve cases of cerebral and cerebellar abscesses with recovery. He attributes his excellent results largely to the use of the Mosher wire gauze cone as a drain. In 1893, McEwen reported 19 cases of cerebral and cerebellar abscess, with 18 recoveries. So far as the writer knows, this record has not been equalled by any of McEwen's contemporaries or followers.

It is of interest to review briefly the various types of surgical procedures for the eradication of an abscess of the brain. Eagleton favors an osteoplastic flap for the purpose of a thorough inspection of the cortex. He finally drains a subcortical abscess if located, however, through a small incision in the dura. King, in 1924, reported three patients successfully treated by cutting away the cortex overlying the abscess, thus allowing the abscess cavity to be extruded by the intracranial pressure. King's method is undoubtedly of great value in certain cases, but does not seem applicable to those abscesses which are deeply seated. If, however, the patient recovers primarily after King's procedure, there is not likely to be a recurrence, which is a possibility in all of the other methods except perhaps where the entire capsule is removed. Dandy greatly simplified the treatment of brain abscess when he proposed tapping of the abscess without drainage. From a personal interview with Dr. Dandy, I have gotten the impression that along with the tapping of the abscess a subtemporal decompression should be done.

The best results in the treatment of brain abscess appear to have been obtained when the abscess was located in the temporal lobe and drained through the mastoid wound. A well-known disadvantage of this procedure, however, is that should the suspicion of abscess not be confirmed, the patient is likely to die of meningitis from operation through a septic field.

In our series of 26 cases of subcortical abscess, in which fairly satisfactory results have been obtained, we have adopted the simplest method of drainage. After localization of the abscess by the history and neurological examination, supplemented if necessary by an air injection, we have tried to approach it as directly as possible. Under local anesthesia, an incision

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of about two inches is made in the scalp, a small opening made by a trephine in the skull, and the dura incised for a distance of about one inch. The veins of the cortex are avoided and a search made for the abscess by a large ventricular needle over which a cannula is placed. The abscess capsule is generally recognized with very little difficulty, because it imparts to the palpating needle, in most cases, a very definite sense of resistance. If the direction of the needle should be oblique, when the abscess capsule is encountered, an effort is made to approach the abscess more directly by a second trephine opening. When the point is discovered where the abscess lies nearest to the skull (and it may require two or three trephine openings to determine this), a ventricular needle is inserted into the abscess cavity and the pus is caught by a suction apparatus as rapidly as it appears in the needle. After a slight reduction in the tension of the abscess by withdrawal of pus, a small soft rubber catheter is inserted through the track of the needle into the abscess cavity. The flow of pus through the catheter is the test of a properly placed drain. If difficulty is experienced in placing the catheter in the abscess cavity, the needle is again inserted and as much pus as possible removed, though aspiration is not practised. The wound is then closed, and in about a week the abscess is again tapped and a second effort made to insert a catheter. This may have to be repeated several times before the catheter is satisfactorily placed. If the abscess is reached at a considerable depth, say 4 or 5 cm., the cannula is sometimes pushed over the needle into the abscess cavity and allowed to act as a drain. A soft rubber catheter, once properly placed, should be allowed to remain until extruded by healing of the abscess.

In our experience the cause of death after operation in all of our fatal cases, except one, has been a septic encephalitis. In this case the abscess ruptured into the right lateral ventricle after the drainage tube had been placed into the abscess cavity. There is a striking contrast between the clinical condition of the patient before operation is attempted, and that of the same patient after the surrounding brain has been traumatized and infected in an effort to drain the pus. In the latter case, the patient has a septic encephalitis and the whole process of re-encapsulation must be repeated by the brain tissues if the patient is to survive. We may say, therefore, that while the patient, in a large majority of cases, will die if the pus is not removed, it may be said with equal truth that if the patient dies after drainage of the abscess, in nearly all cases he dies from trauma and encephalitis produced by an effort at drainage. If the abscess is enveloped in a dense capsule, and unless a large opening is made in the capsule, it may be extremely difficult to insert any kind of drain except a cannula over a ventricular needle. If there is fumbling in the effort to drain the abscess, pus escapes into the unprotected brain tissues around the capsule. It would seem better, therefore, to adopt the simple tapping advocated by Dandy when drainage is difficult than to risk the almost certain production of encephalitis, which results from the spilling of pus into the unprotected brain tissues. We make no effort to inspect and wash out the interior of the abscess nor have we found it necessary to protect the cortex from meningitis. In our experience, regardless of the size of the abscess and the amount of pus removed, the cortex continues to be firmly jammed into the dural opening, and this is what one would expect when it is appreciated that the ventricle on the side of the abscess has been obliterated by the compression of the abscess. When the pus is removed the ventricle expands and keeps the hemisphere against the dura.

When an abscess is completely evacuated and a catheter put in for drainage it will be found that in some cases there is practically no subsequent drainage except that of ordinary repair provoked by the presence of the tube.

Although we have made every effort to simplify the treatment of brain abscess and believe that we have gotten better results by the methods employed than we could have gotten by any other, we have not been willing to discard the drainage tube in every case. If drainage is employed, however, it is highly necessary to insert the drainage tube into the abscess cavity with the minimum amount of trauma to the surrounding brain. In large abscesses, which lie near the cortex, and which produce rapid necrosis of the brain tissues, the method of King would appear to be ideal, although in such a type of abscess it must be admitted that the mortality would be high with any surgical procedure. While abscess formation and development should be promptly recognized, operation is very dangerous before the encapsulation of the abscess takes place. In fact, it might be stated that the longer the operation is postponed, within reasonable limits, pro-

vided rupture of the abscess has not occurred, the better the results. Lilly of the Mayo Clinic states that the best time for operation is when the choked disc becomes stationary, and that if the choked disc is advancing it indicates that encephalitis has not subsided, and operation is dangerous. While it appears to be highly desirable to postpone operation until after encephalitis has abated, it is difficult for the surgeon to wait with a comfortable feeling when he believes that the patient has a brain abscess, with intracranial pressure so great as to cause a choked disc. It is of some consolation to know that spontaneous rupture of brain abscess rarely takes place until very late, but if a choked disc is present, indicating high intracranial pressure, one cannot predict with accuracy when such a rupture may occur. Probably the most frequent termination of the unoperated fatal cases is medullary failure, due to edema of the brain provoked by the abscess.

The general postoperative treatment of these cases is of the greatest importance. Edema of the brain should be combated by hypertonic glucose solutions and reasonable dehydration. Postoperative septic encephalitis, which in some degree nearly always follows drainage, should be treated by liberal feeding to avoid the emaciation which often accompanies this condition. I have kept my cases as quiet as possible after the operation. A stay of two or three months in the hospital is by no means unusual, and many of these cases are required to stay longer. We had one case of right frontal lobe abscess which returned to the hospital three months after discharge with a fatal diffuse meningitis. In no other case, so far as we know, has there been a recurrence of symptoms or a reformation of the abscess.

In the series of twenty-six cases upon which this paper is based, there were twenty-three cerebral abscesses and three abscesses of the right lobe of the cerebellum. Of the patients with cerebral abscess, there were four deaths, with two patients still under treatment in the hospital. One of the three patients with cerebellar abscess died following the attempt at drainage. Four of the patients of the series were operated upon by my associate, Dr. J. G. Lyerly.

CONCLUSIONS

(1) The drainage of brain abscess should be accomplished through a direct approach, with the least possible trauma to the surrounding brain tissues.

(2) If drainage is accomplished with great difficulty, tapping of the abscess, as proposed by Dandy, with a later insertion of the tube, is to be preferred.

(3) Too much emphasis has been placed upon the type of drain and too little upon the avoidance of trauma in the drainage of brain abscess.

(4) From a review of the literature on brain abscess, it would seem that a general tendency in the treatment of this condition is toward simplicity, and that simple methods of drainage give the best results.

(5) This discussion is limited entirely to encapsulated subcortical abscess. It is generally appreciated that operation in the primary stage of the abscess, before capsule formation has taken place, is nearly always fatal.

DISCUSSION (*Abstract*)

Dr. Charles E. Dowman, Atlanta, Ga.—I have nothing to say that is in disagreement with Dr. Coleman. I wish simply to emphasize some of the points which he has brought out.

I am sure that he is correct when he warns against operating on an acute brain abscess. An acute brain abscess is nothing more than an area of suppurative encephalitis which has not become encapsulated. An attempt to drain such a non-encapsulated area will produce more harm than good. One should wait for encapsulation. If encapsulation has taken place the fever has subsided as a rule and the leucocyte count is within the range of normal. If fever and leucocytosis be present the encephalitis is still present or there may have developed a meningitis.

I am particularly in accord with his ideas in regard to the need of utmost simplicity in draining brain abscesses. To traumatize the brain in the presence of an infection is to promote the spreading of an encephalitis. To explore the brain for a possible abscess through an infected mastoid wound is a practice which cannot be too emphatically condemned. When such a method of exploration is practised there is grave danger of producing an infection of the brain.

Whether one should introduce the drain at the time the abscess is first punctured or wait a few days until adhesions have been induced between the cortex and the dura is largely a matter of choice. Personally I have always preferred to tap the abscess and let enough pus escape to relieve the increased intracranial pressure, but to avoid allowing so much pus to escape as to run the risk of losing the firm contact between the brain and the overlying dura. A few days are then allowed to elapse to permit the formation of adhesions between the dura and the brain. When adhesions are formed the abscess is again punctured and a small catheter drain inserted. The principle involved is the same that has been practised for many years in the treatment of abscess of the liver. Unless the drainage tube can be inserted gently and easily I think it would be better

to follow the practice of Dandy and tap the abscess periodically. Such repeated tappings sometimes effect a cure, particularly where the pus is sterile.

Dr. Homer Dupuy, New Orleans, La.—Unquestionably we have made marvelous progress in localizing brain abscesses. But, the workers in this field still differ as to the best method of drainage. Dr. Coleman's results are extraordinary. I shall speak of frontal lobe abscess, which, in the silent area of the brain, gives few localizing symptoms, and has a high mortality. Two patients in the Charity Hospital a few months ago presenting frontal abscess were cured not by tube drainage but by the King method of herniation.

Dr. Oscar Wilkinson, Washington, D. C.—I wish to tell Dr. Coleman that we are not getting as good results in Washington as in Richmond in brain abscess. It has been my observation that it is a good method to expose the dura and leave it exposed for 48 hours, unless the condition of the patient demands the reduction of the tension as suggested by Dr. Coleman. I feel that by waiting 48 hours the arachnoid space is blocked off and the probability of meningitis following the drainage of the abscess is reduced.

I certainly agree with the Doctor in reference to traumatism. I think that has been one of the great causes of fatalities in brain surgery.

Poor drainage has been another cause of fatalities. Some types of case are best drained by the King method, as suggested by Dr. Dupuy, but it is probable that the deeper set brain abscesses would be better treated by the method of Dr. Coleman.

Dr. Clifton M. Miller, Richmond, Va.—I rise to ask a question for my personal information. In those cases with marked choked disc, while waiting for the abscess to localize, to encapsulate, would we be justified in doing a decompression only? In some of these cases secondary atrophy is rather liable to follow, and some of the patients have been known to say, "I am blind, and I wish you had let me die." I should like to know whether it would be justifiable not to search for an abscess that you know is not encapsulated, but to do a decompression and nothing more.

Dr. Coleman (closing).—I agree with Dr. Dupuy that the herniation method is useful in some cases. Unfortunately, many of my patients have had very deep-seated abscesses, a herniation would have meant an incision of 3 to 5 cm. and I thought the amount of pus would almost certainly provoke a septic encephalitis. But there are cases in which that method should be applied.

In frontal lobe abscess, I believe we will reduce the mortality, in the light of the work that is being done all over the country. There are neurological signs, such as suppression of the sense of smell on one side, and drowsiness. If we are in doubt about brain abscess we may make a puncture with a needle. If a patient has choked disc and signs of cerebral disturbance we cannot afford to wait until we are certain that he has abscess. In many cases the operation is exploratory, yet it must be conducted so that we shall at least do no great harm.

I may be a little too enthusiastic about the absence of meningitis in cases in which the dura is blocked off. In one of my cases there were 4 ounces of measured pus, but I have never seen a case in which the cortex reached through the dura. I think this is explained by the fact that when the pus is out the pressure is relieved. The unoperated cases, I think, died from septic encephalitis. Usually in multiple abscess the brain is not able to re-encapsulate. The operative cases, I think, died from septic nephritis in a large majority of cases.

Answering Dr. Miller's question, in one case where I did not find an abscess, I did a decompression because the patient had choked disc. The patient made a good recovery.

The main thing is drainage. I am not at all satisfied with the methods of drainage. I do not think we should have lost the two cases that were encapsulated. They should have gotten well, but they did not; something was wrong. When we get a brain in which there are pathological evidences of conditions which are apt to eventuate in death, we should make the operation as simple as possible, avoid all the trauma we can, and handle the brain very gently.

CHRONIC OBSTRUCTION OF THE DUODENUM*

By MALCOM THOMPSON, M.D.,
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Many text-books of surgery and medicine give but little attention to chronic obstruction of the duodenum. There has been much written upon it, however, in the various journals and it is surprising that it has not been better known clinically. In the *Archives of Surgery* for July, 1929, Higgins presented a thorough study of the subject. In 1923, Duval and his associates of Paris wrote a book entitled "The Duodenum," which dealt with obstruction. This was translated into English by Quain in 1928. The first papers according to Higgins were in 1752, 1820 and 1829. Two of the earlier important papers of modern times were by A. J. Ochsner in 1905, and J. M. T. Finney in 1906.

Time does not permit my covering the subject fully, so much has been learned about it and written upon it during the last few years. I shall attempt to direct attention only to the important features and discuss the phases of a case that has recently come to my attention.

The causes of chronic duodenal obstruction are usually adhesions and compression. To the adhesive type of obstruction Duval gives the term "Essential and Stenosing Periduodenitis." The word periduodenitis implies the presence at some time of inflammation. It is not commonly accepted that an inflammatory process is the cause of all of the adhesions occurring around

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the duodenum, as many of them are thought to be purely congenital in origin. Adhesions causing obstruction have come from the stomach, gallbladder, cystic duct, liver, transverse mesocolon, ascending colon, and posterior parietal peritoneum. These adhesive bands may be due to disease of neighboring organs, such as cholecystitis, but for many of them no cause can be found. They are at times in association with other pathologic conditions such as duodenal ulcer.

Compression of the duodenum is caused by the pedicle of the superior mesenteric artery or by the middle colic artery pressing the third part against the posterior abdominal wall. Several theories have been advanced for the cause of this compression, the most accepted one being an unusual shortness of the mesentery. Duval states:

"Because of the shortness of the mesentery the intestinal loops are held too high, so that instead of resting against the abdominal wall above the pelvis, or on the pelvic organs, the small intestine hangs suspended from above but without other support. This causes it to approach the posterior abdominal wall and to close the arterial compass about the third portion of the duodenum."

Compression by the middle colic artery is due to a low fixation or too loose fixation of the right colon.

The symptoms of this disease are pain, nausea, vomiting, distention of the upper abdomen, toxic manifestations, loss of weight, and constipation. As in other illnesses all of the symptoms are seldom typically present in any one case. The pain comes on after meals, particularly after heavy ones. It begins directly over the site of obstruction and radiates proximally along the course of the duodenum. Nausea and vomiting follow the pain, the vomitus containing bile if the site of obstruction is distal to the ampulla of Vater. The pain and discomfort are usually lessened following an attack of vomiting. The degree of epigastric distention depends upon the amount of dilatation of the duodenum and the stomach. The stomach becomes dilated only after the obstruction has been present for some time and the pylorus fails to function. The toxic manifestations are varied, the most common ones being migraine and malaise. Loss of weight is due to the malnutrition as a consequence of the obstruction. Constipation is due to the retardation of the intestinal contents.

The condition must be differentiated from gastric, hepatic, cholecystic, pancreatic and renal disease as well as other obstructive conditions of the intestine and other lesions of the duodenum. Its frequent association with other intra-abdominal pathologic conditions must be constantly borne in mind. The physical examination reveals little of importance, other than a definite area of tenderness over the point of obstruction. The Roentgen ray is extremely valuable in the diagnosis. Only those of great experience in interpreting gastro-intestinal studies are competent to say whether a duodenum is or is not dilated. It is particularly difficult as "Normally there is some obstruction to the duodenal outlet, chronic ileus being merely an exaggerated physiologic condition" (Crile "Problems in Surgery"). Of the roentgenologic diagnosis, Dr. B. H. Nichols says:

"It is usually possible to make a differential diagnosis of a duodenal ileus when a sizable distention of the second and third portion of the duodenum is found, the most dependent portion of which lies at a lower level than the floor of the stomach, together with a rather large duodenal bulb which, during the period of obstruction, is required to empty against resistance. This finding, together with the characteristic history of a duodenal ileus, will usually establish the diagnosis."

The treatment of this condition is both medical and surgical. Medical treatment consists of posture, abdominal support, and diet. Patients themselves sometimes discover what posture relieves them. The knee-chest posture after meals is often of advantage.

A good abdominal support should be tried, preferably one of the Curtis type. The patient should take small, frequent meals. After a reasonable trial, should medical treatment fail, an operation should be performed. If the obstruction is due to adhesions, the adhesions should be released and an omental graft placed in an effort to prevent them from reforming. If it is due to the pedicle of the superior mesenteric artery, a duodenojejunostomy is the best treatment. When the duodenum is greatly dilated plication should be done also. If the obstruction is due to pressure by the midcolic artery, a suspension of the right colon usually gives relief.

My interest in this condition was aroused by the following case:

Miss J., age 30, white, a bookkeeper, was first seen in April, 1929, with pain in the left epigastrium.

For the previous two years she had had attacks of pain in the left epigastrium and left kidney region. The attacks came on soon after eating and gradually became more severe. At first the pain lasted but an hour or two. Lately the attacks had been more frequent and had lasted longer. Vomiting was not present in the beginning, but had been for the preceding six months. It lessened the pain and sometimes relieved it. The eating of a large meal was almost uniformly followed by the pain, while small meals composed largely of liquids were usually easily digested. The pain began

just above and to the left of the umbilicus and radiated to the right. It had been so severe at times that opiates were required for relief. In April, 1929, she was studied by a group of competent men. Roentgen ray studies of her gastro-intestinal tract, examinations of her blood and gastric content were made and pronounced negative. A diagnosis of stricture of the left ureter was made and three cystoscopic treatments were given. These did not relieve the pain or help her in any way. In September, 1929, she was under the care of an excellent clinician. He treated her medically for several weeks and though he did not make a definite diagnosis, he was inclined to call the condition neurasthenia. He also had Roentgen gastro-intestinal studies made, which were reported negative.

The bowels moved fairly well, but there had been a tendency to constipation. The appetite had been poor for three years. She had forced herself to eat. She had suffered from gas on the stomach, which seemed to work around to the tender spot on the left side, often gathering there and causing her great discomfort. She had lost considerable weight.

She had had scarlet fever and other childhood diseases. She had severe pneumonia with convulsions when she was twelve. In 1919, she had influenza with pleurisy. She often had pharyngitis before she had her tonsils removed in June, 1928. She had had several bad spells of malaria. She had had no operations other than the tonsillectomy and had had no accidents.

The menstrual history had been normal. A pelvic examination in September, 1929, was negative.

Her father and mother were well. Two brothers and four sisters died in infancy, the cause unknown. One paternal aunt and one paternal uncle died with tuberculosis. There has not been any cancer in the family. Several years before, a sister had intestinal obstruction.

Physical examination showed her temperature to be 98.6° F., pulse 90, respirations were 20, blood pressure, systolic 118, and diastolic 78.

The patient was thin, but there were no signs of wasting. The skin and mucous membranes were normal. The head was negative except for scar tissue in the tonsillar fossae. The teeth were in good condition. There was no enlargement of the thyroid. The heart was not enlarged. The sounds were good. The chest had good expansion. There was no impairment to percussion. There were no rales. The abdomen was flat. There were no palpable masses. When the patient stood the left kidney was palpable and freely movable. The liver, spleen and right kidney were not palpable. There was a definite area of tenderness just above and to the left of the umbilicus. The tenderness was particularly marked upon deep pressure.

The patient was in the midst of an attack when she entered the hospital. After several remedies had been tried, gastric lavage was performed. Considerable partly digested food was obtained, some of which she had eaten 24 hours previously. During subsequent attacks the gastric tube was again used. She said that the lavage gave her more relief than any other form of treatment.

Because of the previous diagnosis of ureteral stricture, serial pyelograms and ureterograms of the left side were made. The capacity of the pelvis was 8 c. c., and both the pelvis and ureter emptied promptly. There was no evidence of any stricture and the calyces were normal. The kidney was ptosed, however, and there was an acute angulation of the ureter.

Because of the angulation the studies were repeated and at no time was there any evidence of obstruction.

According to her family physician, several years previously, the patient's sister had had similar symptoms. She was operated upon and a dense band which could be lifted upon the finger was found obstructing the duodenum. The band was incised and she made an excellent recovery. She had gained many pounds in weight and was in good health. Having attended the sister and having been present at her operation, the physician believed that the present patient had a similar condition and advised an operation.

Operation was performed May 4, 1929. The notes are as follows: An upper right rectus incision was made. The liver was situated more inferiorly than usual. The gall-bladder was normal to sight and palpation and emptied easily. There were several small subserous fibromyomata upon the uterus. The adnexa were normal. The appendix was very adherent and long. It was removed in the usual manner, but the stump was not inverted. The stomach and transverse colon were apparently normal. The entire duodenum was greatly enlarged, being two to three times larger than the jejunum. At the beginning of the jejunum there was a network of adhesions almost encircling it. The area of adhesions was about 2 inches wide. By sharp dissection the adhesions were separated, which freed the duodenum except along the posterior wall. Excising the adhesions was almost but not entirely bloodless. The wound was closed without drainage.

The convalescence has been perfectly smooth. When last heard from in October, the patient had vomited but twice since the operation, whereas before operation she vomited almost daily. She had gained in strength and weight, though it is yet too soon to say that she has entirely recovered. During the operation I should have placed a free omental graft over the surface from which the adhesions were removed. Had I been conversant with Duval's book at the time, I should have known the importance of doing so.

As all of us know, nothing can be definitely proved by one case. At the same time much can be learned from a single case properly studied. The factors which impressed me in studying this case are:

(1) The gastric tube should be used more frequently, both as a diagnostic and therapeutic measure. Deaver says that a surgeon should carry a stomach tube about his waist just as an internist always carries a stethoscope in his pocket and permits the ends to hang out. Had the stomach tube been used earlier upon this patient she would have been saved much suffering and the diagnosis would probably have been made sooner.

(2) Chronic obstruction of the duodenum is a definite clinical entity and as such should be more frequently considered in making differential diagnoses.

(3) The fact that the patient here reported had an older sister with a similar condition is interesting from an etiologic viewpoint.

DISCUSSION (*Abstract*)

Dr. I. M. Gage, New Orleans, La.—We have had in our clinic in Tulane five cases in the past three years of unmistakable duodenal ileus, chronic cases, all five cases of marked cholecystitis, proven by physical examination, as well as x-ray.

We treated all of them medically with abdominal support. All types of belts on the market are inadequate. Dr. Duncan, several years ago, in New Orleans, described a belt, which he had been using with excellent results. It is made of very thin aluminum. By the Patients' Surgical Supply Company, a cast is made of the abdomen, a mold is made of the cast, and the thin aluminum is molded into the cast.

Every one of the five patients who has used it has been completely relieved of symptoms. One patient, a girl weighing 99 pounds, with a typical syndrome of chronic duodenal ileus, was of the viscus type. We applied the belt and in six months she had gained thirty pounds and discarded her belt.

This belt is the best support we have to hold up not only the viscus but the kidneys as well.

Dr. Augustus Street, Vicksburg, Miss.—I feel that surgical relief of duodenal stasis is indicated when the stasis has a mechanical cause. However, it is my impression that the cause is functional in the majority of cases. When the duodenum is mechanically obstructed its wall should be hypertrophied and thickened proximal to the obstruction. The cases presenting the very thin, almost transparent wall of the dilated duodenum are not caused by mechanical obstruction, and will not be relieved by duodeno-jejunostomy.

Dr. J. Shelton Horsley, Richmond, Va.—Duodenal dilatation is sometimes a clinical entity and sometimes it is not. Devine, of Australia, says that many cases of duodenal dilatation are due to derangement of the sympathetic nerves in the splanchnic area, just as megacolon may be due to derangement of the sympathetic. He recommends section of the stomach about its middle, closing its distal half, and bringing the cardiac end through the transverse mesocolon and suturing it to the jejunum as in a posterior gastro-enterostomy. Undoubtedly, however, at least some cases of duodenal dilatation are due to other causes, such as pressure of the superior mesenteric artery or mechanical constriction at the terminal duodenum.

Many years ago it was advocated to remove the cecum and ascending colon in order to relieve the pressure of the superior mesenteric artery upon the terminal duodenum when the pressure caused obstruction. This seems to make the punishment much worse than the crime. We should consider the etiologic relation of pathologic conditions in dilatation of the duodenum. When the obstruction is due to mechanical causes, such as stricture or pressure on the terminal duodenum, lateral anastomosis between the dilated duodenum and the jejunum is a satisfactory operation.

Dr. J. T. Nix, New Orleans, La.—This subject has commanded quite a bit of attention at the hospital with which I am connected in New Orleans. Dr. Danna, a few years ago, read a paper on duodenal dilatation and his results have been very satisfactory. We have both worked in the same institution, and because of this fact, I investigated my work very carefully, wondering if I had been missing cases of duodenal dilatation, patients who should have been operated on.

I looked into the matter exhaustively, examined literature, and did not find many men doing the surgical anastomosis. I found more reference to the resection of the cecum and the ascending colon, which seems to be a tremendous operation for relief of such a condition.

We had many patients who showed duodenal dilatation. There is usually a fundamental cause; it may be reflex, it may be allergic, it may be mechanical, but unless the cause is attacked, you do not effect much change in the dilatation.

The treatment of duodenal dilatation is a treatment of the condition that causes it. If it is due to a general ptosis the treatment is medical, wearing of a belt, and the use of a mineral oil or some other agent to keep the duodenum empty. If the condition is of an obstructive type, surgery may be necessary. At all times the allergic factor should be eliminated in these conditions.

I remember a case that I saw about five years ago which I did not label duodenal dilatation, but which I did label intestinal ptosis. I prescribed a Curtis belt for my patient, a very stiff belt, the object being to support and hold up the fallen intestines. The patient had great relief. He returned to me three or four months ago and told me he was completely cured for three years, after which time he took off his belt. I had him go through another x-ray study and this time the report showed, in addition to the general ptosis, a pronounced stasis and dilatation in the second portion of the duodenum. The same Curtis belt was prescribed, and as far as I know, the patient is greatly relieved.

Dr. Thompson (closing).—On the operating table when the duodenum is obstructed, the difference in the diameter of the duodenum and the diameter of the adjacent jejunum is so great there can not be any doubt that there is a definite dilatation.

ANEMIA OF PREGNANCY*

By BRODIE C. NALLE, M.A., M.D., F.A.C.S., Charlotte, N. C.

The literature upon the subject of the pernicious anemia of pregnancy is voluminous and the question of whether it is a true pernicious anemia of the Addisonian type has brought forward a great deal of discussion in the past. At present certainly the consensus of opinion is that it is not a true primary pernicious anemia.

Alder is of the opinion that true pernicious anemia and the anemia of pregnancy, which resembles it, are not the same, and says that true pernicious anemia of the Addisonian type rarely occurs in pregnancy.

Pepper says, "Severe so-called pernicious anemia of pregnancy is not identical with Addisonian anemia. The grade of anemia may be as marked, and certain features of the blood picture suggestive, but other essential criteria are lacking."

William Allan describes the anemia of pregnancy as an acute anemia progressing without remissions, in 75 per cent of cases under thirty-five years of age, curable

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by blood transfusion, while Addisonian anemia is essentially a chronic anemia occurring predominantly in men over thirty-five years of age. It runs a course characterized by remissions, and it is not curable by blood transfusion.

It is reasonable to conclude that the pernicious anemia of pregnancy is not a true primary pernicious anemia.

Comparatively little has been said of the physiologic anemia of pregnancy, although the fact has been generally accepted that physiologic anemia is an entity.

Bland has reported a series of fifty cases of marked anemia of pregnancy with 2,300,000 to 3,980,000 red blood cells. Ninety-two per cent of the cases spontaneously recovered from their anemia within six months after delivery. This he takes as probable proof that these were cases of physiologic anemia and dependent on pregnancy alone.

Alder classifies the anemias of pregnancy as (1) physiologic; and (2) pernicious, and says the pernicious anemia of pregnancy is the reaction of an impaired bone marrow to the pathologic as well as the physiologic demands of pregnancy. A reasonable conclusion and a basis upon which to approach this subject is that a physiologic anemia, presenting a picture of secondary anemia, assumes a pernicious picture when the patient has other causes of secondary anemia such as malaria, hookworm, syphilis, various infections, or when physiologic anemia is superimposed upon an already existing secondary anemia. If this be true the pernicious anemia of pregnancy, which assumes alarming and dangerous proportions and calls for heroic measures, is, to a great degree, preventable and we should turn our attention to preventive treatment.

The object of my paper is not to make a scientific contribution to this subject, but to present blood findings in 200 consecutive cases of pregnancy among private patients who had the advantage of good hygienic surroundings, diet, and so forth, and who apparently were not suffering from any of the usual causes of secondary anemia. I believe that these findings will show that there is a physiologic anemia of greater severity than is generally suspected, and that this degree of anemia undiscovered and untreated, with other causes of anemia superimposed would, in many instances, result in an anemia of such severity as to interfere decidedly with the well being of the patient during pregnancy; to impair her endurance during labor; to lower her resistance to diseases and infections of pregnancy and the puerperium, to predispose her to the toxemias of pregnancy, and to make miscarriage and premature births more frequent.

McSwinney claims that the severe anemias predispose to miscarriage and premature births.

King, in a recent article, reports that pregnant cases suffering with anemia and hookworm disease show a decided predisposition to the toxemias of pregnancy as well as to miscarriage and premature births, and is of the opinion that these predispositions are more probably due to the anemia than to any specific toxin of hookworm.

In this series of 200 cases the blood was examined at intervals during pregnancy, in some cases as early as the third month, and at such intervals thereafter as the severity of the anemia indicated. Some of the series were not seen until later in pregnancy, and among these latter patients, that is, those who had not had treatment, the severity of anemia was greatest.

The tabulations of the results of these examinations show, I think, some rather interesting points. Among the comparatively few cases observed through two pregnancies, the blood picture for the same patient for corresponding months of each pregnancy was practically the same; indicating that the individual ability to respond to the physiologic demands of pregnancy under similar conditions was about constant, and that the degree of anemia varies in proportion to the patient's blood making ability.

It also showed that the anemia was progressive from the third to the seventh month and that the eighth and ninth months showed a slight improvement.

The average blood examination of the cases examined was:

During the third month, 4,300,000 red cells and 80 per cent hemoglobin.

During the fifth month, 3,900,000 red cells and 73 per cent hemoglobin.

During the seventh month, 3,800,000 red cells and 69 per cent hemoglobin.

During the ninth month, 4,200,000 red cells and 72 per cent hemoglobin.

These results would indicate that the physiologic demand of pregnancy was greatest during the seventh month, and that the average blood picture maintained throughout pregnancy in treated cases was about 4,000,000 red cells and 70 per cent hemoglobin. It also shows that in this series of cases:

50 per cent had less than 4,000,000 red cells.

22 per cent had less than 3,500,000 red cells.
2 per cent had less than 3,000,000 red cells.

I wish to repeat that these results were found in cases a great majority of which were examined, observed and treated from the third month to the end of pregnancy. All of them were private patients living under good surroundings with secondary causes of anemia excluded as far as possible.

Bland and Goldstein in a recent article, mention some of their findings from the study of 200 cases of anemia of pregnancy. (The original report has not been published.) Their results were from blood examinations of 200 patients, whom I presume, had not the advantage of early examination or treatment, and probably did not live under particularly good hygienic conditions. They do not mention whether other causes of anemia than pregnancy were present. In their series 50 per cent of the patients had less than 3,500,000 red cells and 25 per cent less than 3,000,000. The percentage of hemoglobin was not given.

There is a great discrepancy between the findings in this series and in mine. Bland found 50 per cent of his cases below 3,500,000 red cells as compared to 22 per cent found in this series. Bland found 25 per cent below 3,000,000 red cells as compared to 2 per cent in this series.

This decided difference of findings is a strong argument for the plea which I wish to make for the early blood study of pregnant cases; for the early detection and removal, if possible, of other causes of anemia; and for early treatment, for by so doing we may avoid the pernicious type of anemia and the severer forms of the secondary type, both of which interfere with the well being of our patient.

I want to report briefly the findings in two cases which I believe were purely physiologic anemias of rather a severe type. In neither case could any cause be found for the anemia except pregnancy. Both of these cases improved greatly under treatment of iron and arsenic and liver extract.

The first case, one month before conception, showed 5,200,000 red cells, and 90 per cent hemoglobin. She was not seen again until her seventh month. Blood examination during the seventh month showed only 3,500,000 red cells and 65 per cent hemoglobin.

In the second case, blood examination three weeks before conception showed red count 4,250,000, and 90 per cent hemoglobin. The patient was not seen again until her eighth month, when the red count was 3,500,000 and hemoglobin 45 per cent.

TREATMENT

In the milder cases (those without other causes of anemia) hygienic measures with attention to diet and the administration of iron or iron and arsenic by mouth seem sufficient.

The severer forms demand more careful observation and treatment. In these cases the addition of liver diet or liver extract, and intravenous injections of iron and arsenic have proven efficient.

Chester Keer, in the *Journal of the American Medical Association* (Vol. 93, No. 8), claims better results in treatment of secondary anemia when liver and iron are used together than when either is given alone.

Porter, of Richmond, Virginia, in his study of secondary anemia has shown that liver extract is particularly effective in the anemia of pregnancy of the pernicious type.

The severe pernicious type responds beautifully to blood transfusion, followed by administration of iron, arsenic and liver. Apparently the early termination of labor is not necessary in these cases.

Following are the red cell and hemoglobin counts of a case treated by blood transfusion and liver diet. The patient was referred to me six weeks after delivery:

June 12, 1929, hemoglobin 15 per cent and red cells 992,000.

June 13, 1929, blood transfusion, 500 c. c. given.

June 16, 1929, blood transfusion, 500 c. c. given.

June 19, 1929, hemoglobin 40 per cent and red cells 2,000,000.

June 24, 1929, hemoglobin 50 per cent and red cells 2,250,000.

CONCLUSIONS

(1) Physiologic anemia of pregnancy is an entity and presents either a secondary or pernicious picture.

(2) The pernicious anemia of pregnancy is not a true primary pernicious anemia, but is the result of the failure to detect and treat physiologic anemia and other superimposed causes of anemia. It predisposes to the toxemias and other complications of pregnancy and the puerperium.

(3) The pernicious type of anemia of pregnancy is preventable and curable in a great majority of cases.

(4) More attention should be given the blood picture in our prenatal care.

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DISCUSSION (*Abstract*)

Dr. E. L. King, New Orleans, La.—We have found a fair number of these patients in our obstetrical service at the Charity Hospital in New Orleans, most of them of rather advanced degree, and practically all of them with little or no prenatal care, generally coming in during the last month or two of pregnancy. In those cases, as the essayist stated, we have found no specific etiological factor upon which we could base a diagnosis of secondary anemia other than the pregnancy. They have been uniformly influenced favorably by blood transfusion. Those have been the severe type where we felt the usual methods of treatment were not advisable. We have followed the blood transfusion with iron and liver extract, and it is interesting to see how well they respond to the transfusion, and particularly how much better off they are after delivery. Some have been extremely ill. There seems to be a tendency also in the severe cases for the baby to be lost, or die *in utero* before delivery is accomplished.

It is a subject worthy of our consideration and no doubt many of these cases in the past have passed unnoticed. The French have been leading on this subject.

Dr. Nalle mentioned hookworm disease complicating pregnancy. I went over that subject this past spring and was surprised to find that in my own service in the City Hospital, in a series of 180 patients admitted up to May first of this year in the white service, more than 20 patients were suffering from hookworm disease, all of them from the country. Some of them, however, had not been in the country recently. Some were from the city, but on inquiry we found they had lived in the country, some as far back as four or five years, showing that this disease can persist even after they are removed from the source of infection. It is interesting to note in hookworm disease that there is a tendency in the severer types toward toxemia, as shown by the elevation of blood pressure and albuminuria. That has been noticed in different parts of the world: one report from Italy, one from Florida, another from Mississippi, have called attention to the increasing percentage of eclampsia in these severely toxic patients. I throw that out as a suggestion, particularly to the men living in rural communities of the South, to be on their guard against hookworm disease in pregnancy. We do not hear as much about hookworm disease as we did twenty or twenty-five years ago, and the impression seems to be gaining ground that we have hookworm disease fairly well under control. But this little investigation seems to show that there is such a thing as hookworm disease in the South, and it behooves us to keep an eye out for it, particularly in pregnancy.

Dr. J. Bay Jacobs, Washington, D. C.—Recently, Galloway of Chicago, reviewed the literature on this subject and found that ninety articles had been written; eighty of them pertained to the pernicious type of anemia; and only ten were written on the physiologic anemia of pregnancy.

A report at this time, on observations made in 200 cases, is a valuable contribution. It is surprising that a condition so common, so easily detected, and of such importance as this has not aroused more interest.

There seems to be a close uniformity in the findings reported by almost all observers, including Dr. Nalle. Lyon of New York reports 200 clinic cases; Galloway studied 228 consecutive private patients; Moore of North Dakota, 100 private patients. In all these series except the last as nearly as could be roughly estimated, the percentage of hemoglobin and the number of red cells is almost constant in the absence of complicating factors. Moore reports 77.7 per cent hemoblogin and 4,140,675 red cells as the average for women living in that agricultural community. Thus it appears that pregnancy exerts a uniform influence throughout this country, affected only moderately by the manner of living, the environment, and other natural factors.

It is reasonable to assume, that as pregnancy advances a certain number of red blood cells are destroyed by the chorion, and the hemoglobin passes through the trophoderm into blood vessels of the embryo.

It is observed that syphilis and multiparity play no part in the etiology. On the other hand, it is found that where toxemia of pregnancy exists, the incidence and severity of anemia is greatly increased.

In my opinion, the close association is not limited to toxins produced by toxemias of pregnancy, for those of bacterial origin may play an important part. Often, in the early puerperium, we are attracted by the extreme pallor and weakness of some patients. In such cases, it is difficult to eliminate puerperal infection as a causative factor of the anemia. I am inclined to think that in this particular type of case the anemia is secondary to an afebrile puerperal infection.

The etiology does not affect the course of treatment. The severe anemias respond nicely to repeated transfusion, especially of unmodified blood; incidentally post partum infection if present responds favorably.

Some men do not advocate treatment in moderately severe cases because of reports that the blood picture has a tendency to return to normal as early as the second week of the puerperium. Their opinions, however, are based upon small series of cases. Alder quotes eleven and Kuhnel 15.

I think that after a larger series of cases is considered, this opinion will be modified, and the importance of routine blood examination in pregnant women and the application of treatment in all cases of anemia will receive proper emphasis.

Dr. Nalle (closing).—The points which I have hoped to emphasize are: (1) that there is an anemia of pregnancy of more frequent occurrence and more marked than is generally known; (2) that this anemia if undetected and untreated interferes with the well being of our patient and predisposes her to the toxemias of pregnancy, premature birth and to the pernicious form of anemia; (3) comparison between the findings in a treated and an untreated series shows the efficacy of treatment.

I feel that more careful study of the blood picture during pregnancy is of great importance and should hold a prominent place in prenatal care.

SPONTANEOUS SUBARACHNOID HEMORRHAGE*

By WILLIAM A. SMITH, M.D.,
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The occurrence of a hemorrhage into the subarachnoid space is not uncommon. It may occur in young or elderly persons and gives rise to a group of symptoms which are typically sudden in onset. The finding of a uniform mixture of blood in the spinal fluid confirms the diagnosis. The most frequent occurrence is in association with injury to the head. Considerable hemorrhage also occurs occasionally in an infectious meningitis. These types I shall not discuss. For the remaining cases, the term "spontaneous" is commonly used, although this term is both meaningless and misleading. The hemorrhage is never more than a symptom, and each case is deserving of thorough study from an etiologic standpoint.

ETIOLOGY

Exclusive of trauma to the head, meningitis and hemorrhage in the newborn, subarachnoid hemorrhage occurs in the following conditions:

(1) *Cerebral Aneurysm.*—Rupture of a cerebral aneurysm is a frequent cause of subarachnoid hemorrhage, not only in elderly persons, but also in children and young adults. These aneurysms may be classified as congenital, embolic and arteriosclerotic. Syphilis is a rare cause of cerebral aneurysm. Among 44 cases of cerebral aneurysm, Fearnsides did not find a single syphilitic one.

Embolic aneurysms are due to localized degeneration of the arterial wall caused by a septic embolus. They occur particularly in young individuals. The aneurysm is usually located on a branch of the circle of Willis, rather than at the base of the brain, and is secondary to endocarditis or septicemia. Symptoms of such aneurysms rarely occur before rupture. At the time of rupture, the patient is usually profoundly ill with evidence of septicemia or of endocarditis. Occasionally, rupture has occurred when an endocarditis was quiescent. Thus in cases of subarachnoid hemorrhage, examination of the heart is not to be neglected. An embolic aneurysm may be suspected when subarachnoid hemorrhage occurs during septicemia or malignant endocarditis. The prognosis is poor in these cases because of the underlying condition.

A cerebral aneurysm may also occur in a young healthy individual who shows no evidence of vascular disease. It is now accepted that this type is congenital, as was first proposed by Eppinger. Fearnsides, in 1915, pointed out that defects in the elastic layer of the media were not uncommon in the arteries making up the circle of Willis, especially at points of bifurcation. It is here, at the base of the brain, that these aneurysms are located. Turnbull found such an aneurysm in a child of only nineteen months of age. Symptoms in these cases rarely occur before rupture. The patient is usually a young adult in good health at the time of rupture. In some cases, there has been evidence of a vascular anomaly in other parts of the body, which has led one to suspect the presence of a congenital aneurysm. The prognosis in this type is quite good, as recovery from the hemorrhage often occurs. Subsequent attacks, however, are to be expected. The period between successive hemorrhages has been as long as twenty years, and as many as five attacks have occurred before death.

Arteriosclerotic aneurysms also are located usually at the base of the brain and may depend in part upon a congenital weakness in the artery. The diagnosis depends largely upon evidence of generalized arteriosclerosis. As in the congenital type, one may obtain a history of periodic symptoms preceding the hemorrhage, due to slight leakages. If the aneurysm becomes large enough, compression of neighboring structures may cause symptoms. With aneurysm of the anterior group of arteries, there may be produced pain in the ophthalmic division of the trigeminal nerve, paralysis of the extraocular muscles, exophthalmos and rarely choked disc, or erosion of the sella turcica with dyspituitarism, hemianopsia and optic atrophy. With aneurysm of the posterior group of arteries, cerebellar symptoms and paralysis of the lower cranial nerves are likely to occur as focal symptoms. With such symptoms preceding a subarachnoid hemorrhage, the presence of a cerebral aneurysm is almost certain.

(2) *Vascular Syphilis and Arteriosclerosis without Aneurysm.*—Vascular syphilis, although rarely associated with cerebral aneurysm, is a frequent cause of subarachnoid hemorrhage. In Symond's collection of 124 cases, ten were due to syphilis. Schaeffer has stressed the importance of hereditary syphilis as a cause of sub-

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arachnoid hemorrhage. In these cases, the diagnosis is based upon the Wassermann reaction or other evidence of syphilis. In arteriosclerosis, subarachnoid hemorrhage may occur in the absence of an aneurysm.

(3) *Hypertension.*—Hytertension, as in cardiorenal disease, may lead to subarachnoid hemorrhage. It may also occur in transient hypertension, as in paroxysms of whooping cough, childbirth, convulsions of epilepsy, eclampsia and other intoxications. Bauer has reported a case of ventricular hemorrhage during an epileptic attack, and in his patient, no vascular lesion was found at autopsy. In some of these cases, the possibility of a congenital aneurysm must be considered.

(4) *Toxic-infectious Diseases.*—A subarachnoid hemorrhage sometimes occurs during an infectious disease, such as typhoid fever or the exanthemata. The primary condition in these cases will be apparent. Sinus thrombosis may also lead to subarachnoid hemorrhage. Some cases have been thought to be due to epidemic encephalitis. A xanthochromic spinal fluid is not uncommon in this disease, but an acute onset with a large amount of blood in the spinal fluid is rare. Lechelle and Alajouanine reported a case in which a subarachnoid hemorrhage was followed by the development of a Parkinsonian syndrome. Camp has observed a similar case. Dufour has collected a series of cases which followed sun-stroke. Subarachnoid hemorrhage may also occur in certain intoxications, as with lead and alcohol.

(5) *Hemorrhagic Diatheses.*—Rarely, a subarachnoid hemorrhage may occur in hemorrhagic diseases, as pernicious anemia, leukemia, scurvy and hemophilia. The diagnosis is made by studies on the blood and by the occurrence of hemorrhages in other parts of the body.

(6) *Neoplasms of the Central Nervous System.*—Neoplasms of a soft vascular character when located near the ventricular or cortical surfaces of the brain may lead to small repeated subarachnoid hemorrhages. Symptoms of an intracranial nature are usually present preceding the hemorrhage. Comfort reported finding xanthochromic spinal fluid in 20 per cent of a series of brain tumor patients. The symptoms of hemorrhage in these cases are likely to be less acute than in cases of sudden massive hemorrhage, as in rupture of an aneurysm.

(7) *Venous Anomalies.*—In infants, Bagley has reported subarachnoid hemorrhage due to rupture of one of the veins of an anomalous venous plexus.

(8) *Obscure.*—There is a group of cases in which the etiology has been obscure. No autopsy was made in most of these cases. Goldflam assumed that the hemorrhage in some of these cases was by diapedesis, due to a vasomotor disturbance, and refers to such hemorrhages as "vasoneurotic." It is possible that a congenital aneurysm has been overlooked in some of these cases.

PATHOLOGY

The pathology differs according to the site of hemorrhage and the pathological background. The hemorrhage may occur over the cortex or at the base of the brain. Usually the base is covered by a bloodclot, which diminishes upward over the cortex; blood passes into the ventricles, particularly the fourth ventricle, and down the spinal canal. Small tears of the pia may be found, but usually the arachnoid is resistant, and no blood is found subdurally. Histologically, there is infiltration of the meninges with leucocytes, which is a reaction to the presence of blood in the spinal fluid. Secondary changes may be found in the brain due to pressure. The pathological condition otherwise depends upon the etiological factor. Later, thickening of the meninges, adhesions and dilatation of the ventricles may develop.

SYMPTOMATOLOGY

It is common for prodromal symptoms to occur. These have etiological significance. In cerebral arteriosclerosis, headache, dizziness, epistaxis, and other symptoms of arteriosclerosis precede the hemorrhage. In some cases, paroxysmal headache resembling migraine has preceded the hemorrhage for a number of years; it is possible that these are due to slight hemorrhages. In other cases, as syphilis, cerebral tumor and hemorrhagic diseases, symptoms of the primary condition usually precede the hemorrhage.

At the time of hemorrhage, the most characteristic feature is the sudden onset of symptoms. The initial symptom is usually a severe pain in the head or in the back of the neck, which causes the patient suddenly to grip the head. With the pain, the patient often falls unconscious. In other cases, the coma is delayed for several

hours, while in a few there is no disturbance of consciousness. Some degree of mental confusion is usually present, and a typical Korsakow's syndrome has occurred. Other symptoms at the onset are vomiting, and localized or generalized convulsions. The signs and symptoms are due to a combination of increased intracranial pressure and meningeal irritation. The initial coma may continue, and the patient die within a few hours from increased intracranial pressure. If consciousness is regained, signs of meningeal irritation appear, and the patient recovers or death occurs from a later hemorrhage. If the patient is conscious at the onset, recovery may occur, or the patient may gradually go into coma and possibly die. The signs of meningeal irritation consist of rigidity of the neck, Kernig's sign, Brudzinski's sign and generalized hyperesthesia. Herpes zoster has also occurred, as in two cases reported by Adie.

Ocular palsies especially of the third and sixth nerves are common. The pupils may be dilated, contracted or unequal. Choking of the optic discs is frequent, and retinal hemorrhages are usually numerous, so that the ocular fundi have a rather characteristic appearance. Hemorrhage into the vitreous has occurred in a few cases. With hemorrhage over the cortex, signs of focal compression occur, as monoplegia, hemiplegia and aphasia. With hemorrhage at the base of the brain, there is frequently a bilateral rigidity of the extremities and a bilateral Babinski reflex. Crossed paralyses may also occur; thus a homolateral third nerve paralysis and a heterolateral hemiplegia occur in case of rupture of an aneurysm of the internal carotid artery. The tendon reflexes vary, usually being diminished at the start, and gradually returning and becoming exaggerated on the paralyzed side. The temperature may be subnormal at the start, but usually rises one or two degrees above normal. The pulse is often slow, and respiratory disturbances may occur.

LABORATORY FINDINGS

If examined early, the spinal fluid is under increased pressure and shows a uniform mixture of blood in successive tubes, with no tendency to coagulation; the supernatant fluid after centrifuging may be colorless in the first few hours, but later is yellow. These characteristics will differentiate an accidental bleeding at the time of puncture. The absence of coagulation in the tube is due to the fact that coagulation has occurred at the site of hemorrhage, and the xanthochromia is due to hemolysis. The fluid first shows cells of the same proportion as in the blood; later, if the hemorrhage ceases, there is an increase in leucocytes, and still later of mononuclears. This pleocytosis is due to a reaction of the meninges to the presence of blood. The fluid gradually becomes normal. Culture and smears show the absence of organisms.

Polyuria sometimes occurs. Glycosuria is not uncommon; it occurred in five cases reported by Romcke. This is due to irritation of central pathways, and is not diagnostic of diabetes mellitus. A massive albuminuria which is transient also occurs in some cases. The blood count frequently shows a leucocytosis, varying from 10,000 to 20,000 cells per cubic millimeter.

DIAGNOSIS

The diagnosis is based upon the sudden onset of the intracranial symptoms outlined above, with signs of meningeal irritation, and is confirmed by the examination of the spinal fluid. In cases with rapid death, one cannot differentiate an intracerebral hemorrhage or embolus without examination of the spinal fluid. In some cases, the hemorrhage is primarily intracerebral, breaking into the ventricles or into the subarachnoid space, but this may be difficult to determine clinically.

The diagnosis of subarachnoid hemorrhage is incomplete unless the etiology is determined. These factors have been discussed. Trauma may be difficult to exclude if a history of recent head injury is obtained. At times, a traumatic subdural hemorrhage must be considered, as the spinal fluid may be yellow and contain red blood cells in this condition; the onset of symptoms, however, is more gradual than in a primary subarachnoid hemorrhage. In cases of meningitis, the diagnosis will depend largely upon bacteriological studies upon the spinal fluid. The onset is rarely as sudden as in subarachnoid hemorrhage, and there are usually a high fever and other symptoms of a grave infection.

PROGNOSIS

The prognosis depends to some extent upon the etiology; it is probably best in cases of congenital aneurysm. It is not at all uncommon for patients to recover from the original attack. Recovery from focal symptoms, such as hemiplegia, may be slow. The possibility of later symptoms due to meningeal adhesions, such as internal hydrocephalus, epilepsy and mental disorders must be kept in mind.

TREATMENT

There are two purposes of treatment: control of the intracranial pressure, and removal of the blood which is irritating to the meninges. These purposes can usually be served by spinal puncture. This must be done carefully, controlling the pressure by the manometer, as sudden lowering of the intracranial pressure might lead to further hemorrhage. As an aid in controlling the intracranial pressure, the intravenous injection of hypertonic solutions, such as 50 per cent glucose may be beneficial. In some cases a subtemporal decompression becomes necessary. If the patient recovers, particularly in cases of aneurysm, physical strains should be avoided.

CASE REPORTS

Case I.—Hemorrhagic Tuberculous Meningitis.—A female child, of 16 months, was admitted to the Henrietta Egleston Hospital on March 24, 1929. The family history was unimportant, and the birth and development of the child had been normal. Two weeks before admission, the child began to vomit and to complain of headache; this continued, and three days before admission, she became stuporous. On examination, the child was lethargic; there was slight rigidity of the neck and a positive Brudzinski sign; the pupils were dilated and did not react to light; the ocular fundi were normal. The blood count showed 18,500 leucocytes per cu. mm. The spinal fluid was yellow and contained numerous red blood cells. The temperature on admission was 99° and it gradually rose to 105° on the fifth day. The spinal fluid continued to show xanthochromia and many red blood cells; cultures and smears did not show any organisms in the fluid, but a very significant finding was an absence of sugar in the fluid. The child gradually grew worse, and the signs of meningeal irritation increased. On the fifth day death occurred following repeated convulsions. A postmortem examination revealed tuberculous meningitis.

In this case, the gradual onset, high fever and absence of sugar in the spinal fluid were important diagnostic features.

Case II.—Subarachnoid Hemorrhage in Syphilis: Recovery.—A colored female, aged 29 years, entered the Grady Hospital (Emory University Division) on October 18, 1927. Ten days before admission she had suddenly developed a severe pain over the left eye, which continued for two days. Six days before admission the pain suddenly recurred and continued for one day. Four days before admission, she again had a sudden pain over the left eye and fell unconscious, remaining in coma for about twelve hours. On regaining consciousness, she complained of stiffness in the neck, pains along the spine and vomiting. She gave a history of having had three miscarriages. Several years previously, she had been given several intravenous injections for edema of the lower extremities, followed by disappearance of the edema. On examination, there was rigidity of the neck, loss of the abdominal reflexes, and loss of the knee and Achilles reflexes on both sides. The pupils were miotic and did not react to light. The ocular fundi showed no changes except retinal arteriosclerosis. The temperature was 99° and the pulse rate was 80 beats per minute. The blood pressure was 160/110. The blood count showed 14,500 white blood cells per cu. mm. with 67 per cent polymorphonuclears. The Wassermann reaction on the blood was strongly positive. The spinal fluid was blood tinged, containing about 400 red blood cells per cu. mm.; there were no organisms in the fluid, and the sugar content was 50 mg. per 100 c. c. The patient gradually improved, and on November 2 (two weeks later) the spinal fluid was normal in all respects. The patient made a complete recovery. This patient evidently had two slight hemorrhages, followed by a third which was more severe.

Case III.—Subarachnoid Hemorrhage, Probably Syphilitic: Death.—A colored male, aged 27 years, entered the Grady Hospital (Emory University Division) on August 13, 1925. On August 8, he had suddenly complained of a substernal choking sensation and headache, and had fallen unconscious. The coma continued for three days. Previous to this attack, he had complained of sharp pains in the legs. His wife had had two miscarriages and four still-born children. On examination, the patient was semiconscious; there was marked rigidity of the neck and a positive Brudzinski sign. The pupils were equal, but reacted sluggishly to light. There was a peripheral type of left facial paralysis; the abdominal and knee reflexes were lost on both sides. The temperature was 99°, and the pulse rate was 70 beats per minute. The blood pressure was 142/98. The spinal fluid showed a uniform mixture of blood; no organisms were found in it. The Wassermann reaction was negative on both the blood and the spinal fluid. The blood count showed 9,540 white cells per cu. mm., with 68 per cent polymorphonuclears. On August 16, the patient suddenly became unconscious, all of the extremities became rigid, and the respirations became very slow. Following a series of convulsions which developed, the patient died. An autopsy was not obtained.

This patient also had two attacks, death occurring from the second. Although the Wassermann reaction was negative, the history is quite suggestive of syphilis in this patient. It is possible, however, that hemorrhage occurred from a congenital aneurysm.

Case IV.—Subarachnoid Hemorrhage in Hypertension and Nephritis: Death.—A colored male, aged 32 years, entered the Grady Hospital (Emory University Division) on October 23, 1927. The history obtained was that about 7 a. m. on the day of admission, he had developed a sudden pain in the neck accompanied by vomiting; at 8 a.m. he was unable to talk, and at 9 a.m. he was unconscious. On examination, the patient was in coma; there was marked rigidity of the neck, a Kernig's sign, loss of the tendon reflexes and a bilateral Babinski reflex. The blood pressure was 180/120, and the pulse rate was 84 beats per minute. The ocular fundi, which were examined by Dr. F. P. Calhoun, showed edema of the optic nerves, with a retinal hemorrhage in the right eye, and a subhyaloid and vitreous hemorrhage in the left eye. The spinal fluid showed a uniform mixture of blood; no organisms were found. The blood count showed 21,500 leucocytes per cu. mm., 86 per cent of which were polymorphonuclear. The blood Wassermann reaction was negative. The urine contained a small amount of albumin, and hyaline and granular casts. The temperature gradually rose to 102° and the patient continued in coma. On October 30, the temperature had reached 106°, and

death occurred on this day. An autopsy was not obtained.

This case illustrates the type in which coma is not immediate; it is also an example of hemorrhage into the vitreous. There is evidence of infection in this case, but the sudden onset, hypertension and urinary findings are more in favor of a vasculorenal origin.

Case V.—Subarachnoid Hemorrhage in Arteriosclerosis: Death.—A white female, aged 51 years, was first seen on June 20, 1929. There was a history of hypertension and frequent headache for three years. On June 13 she had suddenly developed a severe occipital pain, associated with nausea; on June 17, a ptosis of the left upper eyelid had been noted; on June 18, speech had become difficult, and a weakness of the right arm and leg had been noted. On examination, the patient was stuporous; there was a paralysis of conjugate movements of the eyeballs to the right; there was a hemiplegia on the right side. The spinal fluid was yellow, and contained many red blood cells. The temperature was 99°. The blood count showed 9,550 white cells per cu. mm. and examination of the urine gave normal findings. The patient continued to be comatose in spite of spinal drainage, and on June 29, examination of the ocular fundi showed edema of the optic discs measuring about 4 diopters; there were retinal hemorrhages in the right eye, and a vitreous hemorrhage in the left eye. A subtemporal decompression was done by Dr. C. E. Dowman, but the patient continued in coma, and death occurred on July 23, 1929. The systolic blood pressure was above 200 mm. of mercury. An autopsy was not obtained.

This case is an example of continuous hemorrhage, probably from an arteriosclerotic aneurysm; there was also a hemorrhage into the vitreous. Spinal drainage, injection of hypertonic solutions and even a subtemporal decompression were of little benefit.

Case VI.—Subarachnoid Hemorrhage in Arteriosclerosis: Recovery.—A white male, aged 47 years, was first seen on March 4, 1927, complaining of headaches which had been present for three weeks. Three days before examination, the headache had suddenly become very severe and was associated with nausea and vomiting. During these three days he had been quite drowsy. His past history was unimportant except that he had been a rather heavy drinker of alcoholics. On examination, there was a slight drooping of both upper eyelids, a weakness of the left external rectus muscle, and weakness of the left arm and left side of the face. The tendon reflexes were exaggerated on the left side, but there was no Babinski reflex. There was a diminution in sensation to light touch over the left arm and leg, a loss of sense of position in the toes and fingers on the left side, and an astereognosis on the left side. The speech was indistinct, and there was considerable mental confusion. The temperature was normal, and the pulse rate was 60 beats per minute. The blood pressure was 160/120. The blood count showed 18,200 white cells per cu. mm. The urine contained a trace of albumin, but was otherwise normal. The spinal fluid was under 360 mm. (water) pressure, and showed a uniform mixture of blood. The patient was given daily spinal drainage, and gradually he improved. On March 9, the pressure of the spinal fluid was 110 mm. (water), and the fluid was clear and yellow. The weakness in the face and arm gradually improved, and had disappeared on March 12. The Wassermann reaction was negative in both the blood and spinal fluid.

This is an example of a subarachnoid hemorrhage in cerebral arteriosclerosis; alcohol was undoubtedly a contributing factor. The patient later died of an intracerebral hemorrhage on the opposite side. The postmortem examination revealed marked arteriosclerosis but no aneurysm was found.

Case VII.—Subarachnoid Hemorrhage Secondary to Intracerebral Hemorrhage in Arteriosclerosis, with Recovery.—A white male, aged 68 years, was first seen on March 15, 1929. Four days before examination, he had developed a sudden severe headache, accompanied by vomiting, weakness of the left arm and gradual onset of stupor. On examination, there was a paralysis of conjugate movement of the eyeballs to the left, and a hemiparesis on the left side; the ocular fundi showed retinal arteriosclerosis, but were otherwise normal. The systolic blood pressure was 116 mm. of mercury. The spinal fluid was under 165 mm. (water) pressure, was yellow and contained many red blood cells. The patient did not improve, and on March 18, it was noted that there was a choking of the optic discs, and the paralysis had increased. A craniotomy was performed by Dr. C. E. Dowman, and it was found that the patient had had a hemorrhage into the right frontal lobe, rupturing through the cortex on the inferior surface. Following operation the patient gradually improved, but death occurred some weeks later from a hemorrhage in the opposite hemisphere. A post mortem examination showed marked arteriosclerosis. This is an example of subarachnoid hemorrhage occurring secondarily from an intracerebral hemorrhage which ruptures through the cortex.

Case VIII.—Subarachnoid Hemorrhage in Purpura: Death.—A white boy, aged eight years, was first seen on October 20, 1926. For three weeks, before examination, there had been numerous hemorrhages beneath the skin, and from the bladder. At 2 a. m. on the day of examination, the patient suddenly became unconscious, and it was noted that there was a paralysis of the right arm and leg. On examination, there were multiple subcutaneous hemorrhages; the patient was in coma, and no tendon reflexes could be obtained. The temperature was 100°, the pulse rate was 102 beats per minute, and the respirations were very feeble and shallow. The spinal fluid was under 170 mm. (water) pressure and showed a uniform mixture of blood. Although the respirations had practically ceased, a rapid subtemporal decompression was performed; the dura was found to be very tense, and there was a hemorrhage at the base of the brain. Death occurred a short time later. No autopsy was permitted. This is an example of subarachnoid hemorrhage occurring in a hemorrhagic disease. It was unfortunate that time did not permit a more extended study of the etiology in this case.

Case IX.—Subarachnoid Hemorrhage Associated with Cerebral Neoplasm: Death.—A white male, aged 33 years, was first seen on April 15, 1921. He had complained of severe frontal headaches for three years; at times, the headaches had been associated with vomiting. His vision had been failing for three months. Two weeks before examination, he had developed generalized convulsions, and had had five attacks during this time. On examination, there was a weakness of the left external rectus muscle; the ocular fundi showed a marked venous engorgement but were otherwise normal. There was a marked asynergy on the left side, with a tendency to fall to the left. The blood pressure was 100/75, and the pulse rate was 80 beats per minute. A Roentgen ray examination showed an area of rarefaction in the

left occipital bone. The spinal fluid showed a uniform mixture of blood, but no organisms. A diagnosis of cerebellar neoplasm was made, and a cerebellar exposure was made by Dr. C. E. Dowman. The posterior cistern was found distended with fluid, but after a decompression, the wound was closed because of the poor condition of the patient. Following the decompression, the patient did not improve. On May 8, he was found unconscious, with rigidity of the extremities and a bilateral Babinski reflex. Death occurred three days later. A post mortem examination showed a neoplasm in the left frontal lobe, a neoplasm in the right occipital lobe, and a neoplasm in the vermis of the cerebellum. These growths were all of the same nature, and were diagnosed as peritheliomata. The growth in the occipital lobe contained a hemorrhage, which had invaded the posterior portion of the corpus callosum and the ventricles.

This is an example of subarachnoid hemorrhage associated with a cerebral neoplasm.

Case X.—Subarachnoid Hemorrhage Probably Due to Arteriosclerosis: Recovery.—A white female, aged 50, was first seen on February 12, 1926. Three days before examination she had suddenly fallen unconscious, and had remained so for several hours. On regaining consciousness, she complained of pain in the neck, and weakness of the left arm. On examination, the patient was mentally confused, and there was marked generalized hyperesthesia. The pupils were equal and reacted normally. There was marked rigidity of the neck, and a hemiplegia on the left side. There was a bilateral Kernig sign. The ocular fundi showed a papilledema of about 2 diopters, but there were no retinal hemorrhages. The temperature was 100°; the blood pressure was 136/80. The spinal fluid was brownish, and contained many red blood cells. The Wassermann reaction was negative, and the gold curve was 1,100,000,000. The patient was given spinal drainage on alternate days, and she continued to show signs of meningeal irritation for three weeks. On March 9, the spinal fluid was clear and yellow, and the patient felt entirely well. She was last seen on June 1, 1926, and there was still a slight weakness on the left side. In this case, the spinal fluid did not become normal until six weeks after the hemorrhage.

Case XI.—Subarachnoid Hemorrhage, of Obscure Cause: Recovery.—A white male, aged 42 years, was first seen on March 24, 1929. He had complained of intermittent headaches for fifteen years. Two weeks before examination he had had a sudden severe pain in the head associated with vomiting, and followed by marked irritability and mental confusion. A spinal puncture had been done, and the spinal fluid had been found to be bloody. On examination, the patient was confused and disoriented. There was rigidity of the neck, but no paralysis. There was some engorgement of the retinal veins. The blood pressure was 120/84. The spinal fluid was yellow, and contained many red blood cells; the Wassermann reaction was negative, and the mastic curve was 25,100. The temperature was normal. There was an eruption of herpetic type over the right lower lip. A Roentgen ray examination of the head showed an area of rarefaction in the right occipital bone. As it was felt that this might be neoplastic, this area of bone was removed by Dr. C. E. Dowman. The microscopic examination of the bone involved showed "numerous large blood spaces, irregular in shape and size and filled with blood; no neoplastic cells were seen; the structure present appeared to be hypertrophy of the blood spaces." The patient gradually made a complete recovery.

In this case, there was a history of intermittent headaches for years preceding a subarachnoid hemorrhage. It is also illustrative of the occurrence of herpes. The occurrence of a vascular anomaly in the skull suggests the possibility that this patient has a congenital aneurysm.

Case XII.—Subarachnoid Hemorrhage in Whooping Cough, Followed by Internal Hydrocephalus Due to Meningeal Adhesions.—A child of four years was first seen on August 2, 1929. The child had been well up to June, 1929, when he acquired whooping cough. Severe paroxysms of coughing continued for four weeks. Two weeks before examination, the child began to complain of headache and vomiting. There had also developed an ecchymosis of the sclera of the left eye. On examination, there was a bilateral choked disc, and a nystagmus; the neurological examination revealed no other abnormal findings except a slight unsteadiness in gait. It was felt that the patient had probably a medulloblastoma of the fourth ventricle, but the possibility of a meningeal hemorrhage associated with whooping cough was considered. A ventricular puncture was made by Dr. C. E. Dowman which showed that the lateral ventricles were distended with fluid under pressure. A cerebellar exposure was then made, and the dura was found to be under tremendous pressure. There was no evidence of neoplasm, but there were numerous adhesions between the dura and the arachnoid, and obstruction to the flow of fluid. It seemed that the most probable cause of the meningeal adhesions was a slight subarachnoid hemorrhage associated with whooping cough.

This case illustrates the occurrence of slight hemorrhages with transient hypertension, and the late results due to the formation of meningeal adhesions.

CONCLUSIONS

Subarachnoid hemorrhage is a symptom which may occur in a number of conditions. The diagnosis is incomplete unless the etiology be determined. The most common causes are cerebral aneurysm, syphilis, arteriosclerosis, hypertension, toxic-infectious diseases, cerebral neoplasms and hemorrhagic diseases. The diagnosis can usually be made by the sudden onset of symptoms, evidence of meningeal irritation, and the finding of a uniform mixture of blood in the spinal fluid. The prognosis depends upon the etiological factor. Cases illustrating the various types are presented.

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DISCUSSION (*Abstract*)

Dr. R. Finley Gayle, Richmond, Va.—This condition is undoubtedly most infrequently recognized. I think that more true in the case of the general medical men than of the neurologists. Very frequently these cases are thought to be hemorrhages in the brain substance rather than in the subarachnoid space. There is little or nothing in the medical books about spontaneous subarachnoid hemorrhage. I recently went over a good many approved text books and found absolutely nothing about this subject. In most of the cases that I have seen, the etiological factors were a low grade syphilitic meningitis or irritation. We have recently had a case under observation with acute epidemic encephalitis, which during the course of the illness developed acute headaches with unilateral paralysis, and we felt that the patient had a spontaneous subarachnoid hemorrhage because of the presence of the classical signs of the disease. I think the main point of diagnosis is the presence of blood in the spinal fluid.

Dr. C. S. Holbrook, New Orleans, La.—I have had a good deal of difficulty in arriving at the diagnosis and a satisfactory cause of the subarachnoid hemorrhage in many cases that I have seen. I have had especial difficulty in arriving at the cause in the cases that have gotten well. Though I recall at least three or four cases that have come to autopsy, a satisfactory explanation of the hemorrhage was not always apparent.

I had a case in a boy who was twenty years old when he died. His first attack of unconsciousness was in the tropics, where he was more or less unconscious for several days, but gradually recovered. Then there was a period of six years or so, during which time he came up to the States, had another similar attack and was admitted to the hospital with stiffness of the neck, rigidity, and unconscious. A tap showed diffuse blood in three or four tubes. He got over this illness after a month or two in the hospital. Another five years went by and he repeated the same things. By that time we felt that he had a brain tumor. At autopsy a diffuse soft glioma was found. He had had three attacks, five or six years apart, and the boy had evidence of this tumor for at least twelve or fourteen years to my knowledge. On the two occasions that I saw him he had bloody fluid which remained bloody for several days.

Dr. R. Glen Spurling, Louisville, Ky.—This condition seems to me to be of relatively frequent occurrence. There are two points which I should like to discuss briefly: first, cases of sudden spontaneous subarachnoid hemorrhage associated with palsy of the extra-ocular muscles are frequently due to aneurysm of the basilar cerebral arteries. As has been pointed out by Dr. Smith, such aneurysmal dilatations may be very small or may attain considerable size before rupture occurs. When certain portions of the circle of Willis or its branches are involved by aneurysms, direct pressure may be made upon the nerves supplying the extra-ocular muscles either in their course or at their nuclei. Secondly, symptoms of subarachnoid hemorrhage are probably due largely to an irritative meningitis set up by the presence of blood in the cerebrospinal fluid. It is a well known fact that the meninges tolerate blood poorly. Meningeal symptoms of severe magnitude are commonly due wholly to blood in the cerebrospinal fluid.

This, then, brings us to the rationale of repeated lumbar punctures as the therapeutic measure in this disease. Assuming that sufficient time has elapsed for the hemorrhage to have ceased, then it becomes a matter of absorption or withdrawal of blood in the cerebrospinal fluid in order to alleviate the meningeal irritation. The blood will eventually be absorbed, other things being equal. But during the several days when absorption is occurring, the meningeal symptoms may be very severe. By repeated lumbar punctures, the blood is gradually withdrawn and newly formed fluid dilutes that which remains. Symptoms, particularly headaches, are always relieved to some degree. Repeated punctures are, of course, only a part of the treatment, but in my experience they have had a most important part in affording symptomatic relief.

Dr. N. R. Smith, Tulsa, Okla.—Dr. Spurling has very properly emphasized the necessity of getting rid of the blood to give these patients relief from its well-known irritating effects. I had one experience, however, which shows that one must be cautious because it seems possible that with repeated punctures the hemorrhage may continue. It is possible, of course, that in this particular case there was some disturbance in the blood itself that maintained the hemorrhage. In one other instance I saw a patient very early in the course of an illness that suggested subarachnoid hemorrhage. The spinal fluid at the lumbar space was normal, while the specimen from the cistern showed abundant fresh blood. Dr. Smith's paper emphasizes the relationship of various clinical conditions that may produce subarachnoid hemorrhage.

Dr. Smith (*closing*).—During coma the tendon reflexes are usually absent. If the hemorrhage is at the base of the brain, there is usually a marked rigidity of the extremities on both sides, with a positive Babinski reflex on both sides. If the hemorrhage is over the cortex, the Babinski reflex is usually unilateral. As the patient regains consciousness, the tendon reflexes return, and become exaggerated in the paralyzed extremities.

In regard to the diagnosis of aneurysm, particularly of the anterior group, we have learned much. The diagnosis depends on both the focal signs and the evidence of subarachnoid hemorrhage at some time. The focal signs alone will not differentiate an aneurysm from a neoplasm, while the appearance of focal signs only after hemorrhage is not sufficient for the diagnosis of aneurysm.

The removal of blood is an important measure, because organization may lead to meningeal adhesions and internal hydrocephalus, as in the last case reported.

THE PROGRESS OF COUNTY HEALTH WORK IN THE SOUTH*

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It is now almost twenty years since the establishment of the first whole-time county health departments in the United States. They have been for the most part years of trial and experimentation, attended by the successes and failures that characterize all ventures into new and uncharted fields. But progress, while it has seemed to be slow, has nevertheless been real, and the knowledge and experience of these pioneer years has provided a foundation upon which we may build more rapidly and with more assurance in the future.

The plan of the whole-time county health department is in all probability a natural outgrowth of the hookworm dispensary work which was begun in the Southern states in 1910, under a cooperative arrangement between the Rockefeller Foundation and the states. The results of hookworm treatment could be lasting only if the causes of hookworm infection were removed, and this entailed intensive community sanitation. After a little experimentation along this line it became evident that a whole-time health official was required to maintain the improvements that had been made, and to extend them into other communities. Without such service it was found that it was a practical certainty that the improvements brought about through an intensive campaign of sanitation would soon degenerate into their former condition and afford a useful argument against the adoption of such a campaign by other communities. One of the most difficult problems that I have ever encountered in gaining the support of a county for a program of public health work has been where an intensive sanitation campaign had been conducted without provision for permanent maintenance. The county authorities had witnessed the disintegration of the sanitation work and they and many of the citizens as well were convinced that money had been wasted and that all efforts to bring about sanitary improvements were thoroughly impracticable.

The whole-time county health officer was followed very shortly by the development of the whole-time county health department because of the demand for an increased range of health activities and the tendency on the part of communities to become surfeited by one special line of work continually emphasized. Whole-time county health officers were installed first in the states of North Carolina and Washington in 1911, to be followed almost immediately by whole-time county health officers and health departments in Mississippi, Virginia and perhaps in other Southern states.

Beginning in 1911 and continuing for several years, the surveys of typhoid fever and of rural health conditions conducted by Dr. L. L. Lumsden, of the Public Health Service, in cooperation with a number of states, added greatly to the store of knowledge and emphasized the need for a constructive program of organized rural health work throughout the Country.

An important milestone was reached in 1912, when there appeared for the first time one brief reference to a "County Health Organization" in the Annual Transactions of the State and Territorial Health Officers with the Public Health Service. In the Transactions of the 1914 Conference of the same body a suggestion of progress is indicated by Dr. Louis I. Dublin, who made the following statement:

"You will perhaps remember the questionnaire which our office sent out recently to the states inquiring into the conditions of county health service. When these were tabulated the conclusions were unavoidable that the states were just beginning to take their county health organizations seriously. Only 5 states have full time county health officers. Two of these states have 2 county health officers on full time. Only one state, North Carolina, has 11, and she stands at the head of the list. In the other states, county health of-

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ficers are uniformly part time officials. They are paid nothing, or a mere pittance, the prevailing salary being about $150 per year.

"We shall never get good public health service on this basis. The solution is then to awaken a strong sentiment for full time county health officers. When they are available, health service will improve at once."

One year later, in 1915, Dr. Lumsden, in describing to the State Health Officers' Conference the results of a survey he had just completed in four counties, states:

"In one of the counties 78 per cent of the houses had no toilet of any kind. In less than one-half of one per cent of the 14,000 houses visited and surveyed in the four counties was there a method of disposal of human wastes which approached a sanitary method. In our rural districts generally we are just about where we were 100 years ago as far as sanitary conditions are concerned. If anything they are worse because the population of the rural districts is becoming denser and denser."

With the advent of 1916, there appears to have been an increase in the number of Southern counties which were engaging in health work, but in all too many instances the "organization" consisted of a lone county health officer, who, in the words of Dr. W. S. Rankin, then State Health Officer of North Carolina, was obliged to spend from three to six years in finding out how to take care of his job and what the methods of a whole-time county health officer should be. "It is the most difficult problem I have ever confronted," says Dr. Rankin, "trying to define the functions of the whole-time county health officer and the method by which these functions shall be carried out. If some one will answer that question and send me the answer, he will confer a great benefit on me and on my State."

In the same year Dr. Lumsden completed his sanitary surveys which covered some 18 counties in 16 states. Among the conclusions were: (1) that at less than 2 per cent of the rural houses are the most essential principles of sanitation consistently in practice; (2) for less than 3 per cent of our rural population is local health service approaching adequacy provided; (3) sustained efficient whole-time local health service is essential to the establishment and maintenance of reasonably good sanitary conditions in our rural districts; and (4) duly efficient personnel for rural health work generally cannot be expected without participation by central agencies such as official state and national health agencies.

On July 1, 1917, the first Federal appropriation was made for "Studies of, and Demonstration Work in Rural Sanitation," to be conducted by the Public Health Service. The amount was $25,000. For the two years following, the appropriation was increased to $150,000 and was used almost entirely in areas around the military camps, and important war industries where it served to protect the military forces and the civilian population and to add to our knowledge both in regard to securing local appropriations and the conduct of rural sanitation work.

On January 1, 1920, the number of whole-time county health departments in the United States had increased to 109, of which 67, or 61.4 per cent, were located in the states included in the Southern Medical Association as follows: North Carolina, seventeen; Georgia, sixteen; Alabama, twelve; South Carolina, six; Virginia, six; Kansas, five; Mississippi, five; Texas, five; and one each in Arkansas, Kentucky, Louisiana, Oklahoma, and Tennessee. Florida, Maryland, Missouri, and West Virginia had as yet developed none.

On January 1, 1924, the counties in the United States with whole-time health service numbered 250, of which 66.8 per cent were in the states covered by this Association.

On January 1, 1929, the counties or comparable jurisdictions provided with whole-time local health service had increased to 467. Three hundred and sixty-two of these counties, or 77.5 per cent, are in the states included in the Southern Medical Association. These states, which contain 51 per cent of the rural population of the United States under the 1920 census, also account for 77.4 per cent of the total rural population of the country which is provided with whole-time local health service.

Progress of a somewhat different sort is indicated by the enabling legislation which many states have passed for the purpose of making possible the development of the county health department plan. State appropriations for county health work on an increasing scale are also the rule and in one Southern state at least have gone from $10,000 per year in 1923, to $120,000 per year in 1929.

A most valuable and encouraging indication of progress is the steadily increasing number of articles which are seen on the subject, both in medical journals and the public press. It is rare indeed to attend a medical meeting at the present time at which various phases of local health work are not prominently featured in the program and followed almost immediately by head-

lines on the front page of the local press. As is also known to most of you, the American Public Health Association has a special committee which is now engaged in an intensive study of rural health practice with the hope that improved methods may be developed through the knowledge gained.

Few people who have not been in the field can appreciate the tenacity of purpose and devotion to duty which this progress so briefly outlined has required. To establish and maintain the work has demanded an unusual amount of ability on the part of the men and women engaged in it, and an abiding faith in the soundness of the principles involved and in the ultimate permanent success of the program. Thanks to these qualities this plan of organized county or local health work is now generally recognized as the best practicable means of providing health service to local communities, and there is abundant evidence that in the near future it will be much more widely extended and with slight modifications adopted in sections of our country which a few years ago had scarcely considered the possibility of local whole-time health service.

It may now, perhaps, be well to outline very briefly a few of the measures which in my opinion are essential for further progress in the immediate future. The work should be extended, of course, and this will follow at a rate which will be determined by several factors. It should, however, with the knowledge which we now have, be possible to provide a more efficient and more nearly adequate health service, both in the old communities and in those in which it is to be established for the first time. Thus far we have had to content ourselves with furnishing a minimum of service at the lowest possible cost. The severest criticism to which we have been subjected is founded on the fact that our personnel and facilities are not sufficient to supply the needs. The question is not infrequently asked as to why the growth of county health departments and their extension are so slow. I venture to suggest that one of the most important reasons is the relatively small part of the population of a county which the average organization is able to reach in such a way that the people know about it. Observations have revealed the fact that only 10 per cent of the population may actually be reached, in such a way that they know it, even by a fairly good local health department as local health departments go. By recognition of this fact and a strenuous effort to overcome the defect it has been possible to extend definite service to 60 per cent of the people. This situation has prevented us from receiving a great deal of the support which is actually available and has forced us to depend upon our powers of salesmanship rather than on the service rendered. I am well aware of the difficulties encountered in securing larger appropriations for local health programs, but I am convinced that the time has come when we should seek to inform our communities in some detail and through every means possible as to the vastly improved and more beneficial service which their health departments can render if adequately supported. We know in every instance what is needed to enable us to carry out a satisfactory program of work which will gain additional recognition and support among our people. We should now be trying to get what we know we ought to have, and which our communities really want us to have, although they may not recognize the fact.

Another need for the future which is worth reiterating is that of carefully selected and better trained personnel. In the past we have been forced to gather together whatever personnel could be found available and turn it loose in our counties with very little experience and instruction. This is fair neither to the personnel nor the communities. We are now thoroughly aware that the principles are sound and that efficient, well trained personnel results in a vital institution, while on the contrary, weak personnel invariably results in an indifferent and poorly supported project. The means are being developed rapidly to improve the situation regarding personnel, but the importance of this matter for future development should be kept uppermost in mind.

As one who has attempted to prepare a paper on progress in county health work, I may say with feeling that consideration might well be given to the development of criteria by which we may better measure progress in this field. Some studies have already been made with this purpose in mind and others are in contemplation. I am sure that much remains to be done in this direction.

Discussion follows paper of Drs. Underwood and Applewhite, page 507.

WHOLE TIME COUNTY HEALTH WORK IN MISSISSIPPI*

By FELIX J. UNDERWOOD, M.D.,
and
C. C. APPLEWHITE, M.D.,
Jackson, Miss.

The state health departments of practically all of the states in the Union are charged by law with the responsibility of protecting the people residing therein from the ravages of acute communicable diseases, and most of them with the duty of promoting a state of good health among the entire citizenship. How to accomplish these results most effectively and at the same time most economically has been a subject which has been accorded much thought and no little experimentation in the past. In Mississippi it has been thoroughly demonstrated that the central department can achieve the best results in disease prevention and health promotion through the agency of the county health departments, manned by full time personnel well trained in public health. During recent years the State Board of Health has placed particular stress, therefore, upon the creation and maintenance of full time county health departments rather than the creation of an enormous central organization. The wisdom in following this policy has been amply demonstrated during the past few years by the results which have been accomplished by the full time health departments. The chief plan for future development of the public health program in Mississippi embraces the education of the people of the State as well as their official local representatives to the realization of their individual and collective responsibilities for the morbidity and mortality rates in their respective counties. The ultimate aim of the State Board of Health, therefore, is to establish in every county in the State a permanent county health department through which the public health problems peculiar to the respective counties can be solved in proper sequence and proper relation to each other. In order that the best results may be obtained in the program of county health work it is essential that certain fundamental principles be strictly observed. These may be enumerated as follows:

(1) Public health work must be done under medical supervision.

(2) It must be free from political interference.

(3) It must be placed upon a permanent basis.

(4) A reasonable common sense public health program must be executed.

It is deemed fitting at this time to offer a brief discussion of these principles.

Medical Supervision.—If the public health program of any state is to be permanently successful, it is absolutely necessary that the members of the medical profession of that state be brought to a realization of their individual and collective responsibilities in the matter of promoting the public health. This can easily be accomplished by according to the medical profession its deserved place of leadership in the public health movement. Nothing stimulates greater interest than the feeling of ownership and responsibility for the success or failure of any movement. Leadership in public health rightfully belongs to the medical profession, and the lay public is willing and ready to follow so long as constructive leadership is maintained. In Mississippi the whole public health movement is the child of organized medicine, for eight of the ten members of the State Board of Health are appointed by the Governor from a list of physicians nominated by the State Medical Association. The ninth medical member of the Board of Health, the Executive Secretary, is elected by the Board, and he and practically all of the medical members of the central and field staffs are active members of the State Association. The term of office of each member is six years. It is of interest to note that during no one governor's tenure of office does the term of office of a majority of the members of the Board expire, thus insuring a continuity of policies and a removal, so far as it is humanly possible, of the public health work in Mississippi from political interferences. Thus, it can readily be seen that the organized medical profession of Mississippi is the legally designated leader in public health. It is indeed a pleasure to state that the profession has responded nobly to this call to service, and further, that the success of the public health movement in the State of Mississippi has been due, in a large measure, to the enthusiastic backing given it by the medical profession. It is felt that this enthusiastic cooperation has been occasioned largely by the legal assignment of the medical profession to a place of leadership. It is further felt that the

*Read in Section on Public Health, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

medical profession of any state can be depended upon to lead constructively in the field of public health if the opportunity is afforded. No public health program can be a complete success without the active support of the medical profession.

Non-Political.—In order to execute an effective public health program all workers in this field, both state and local, should eschew politics. For progress to be made it is essential that health work be placed beyond the reach of politics. In fact, if public health workers are conscientious in their endeavors to carry out a well rounded program, very little time and less inclination will be available for meddling in politics. When any health department is permitted to be used to further the private ambition of some politician, then its function as a public servant is seriously handicapped, its progress markedly retarded, the confidence of the general public is forfeited, and the value of the work of the department is immeasurably lessened. In Mississippi every effort is made to keep the entire public health program free from politics. The reasons for the elimination of politics from public health work are perfectly apparent to every one who is passingly familiar with public health administration.

Permanency.—If real worth while results in disease prevention and health promotion are to be obtained, county health departments must be placed upon a permanent basis. Experience has shown that spectacular whirlwind campaigns do not produce lasting results. One of the chief functions of a health department is to teach the people the fundamental facts of preventive medicine. The education of the masses is a slow and tedious process and requires constant and persistent effort, hence the necessity of making the work permanent.

The lack of stability of local health departments in the past and the uncertainty of the tenure of office has very materially militated against the entrance of well trained young men into the field of public health as a life work. This has occasioned a shortage in well trained personnel which in turn has impeded the development of new health departments. Mississippi is fortunate in that it has a most excellent county health department law passed in 1920 and subsequently amended which authorizes the consolidation of all local health agencies. This law has markedly stabilized and tended to make permanent local health work in this State. After an efficient health department has been in operation a few years and the people served by it become aware of its usefulness, it becomes a fixed agency in the local governmental machinery just as the educational and law enforcing departments.

Effective Program.—A public health program to be effective must be based upon reason and common sense. Special emphasis should always be placed upon those measures which have been proven to be effective in reducing the incidence of diseases and raising the general health tone among the people. Mention is here made, merely to condemn them, of the spectacular measures which are sometimes utilized by some health workers. The need for spectacular demonstrations in public health has passed, if it ever existed. As a result of some of the spectacular methods which have been used in the past the cause of real worth while public health work has suffered almost irreparable loss in prestige, not only among the laity, but what is worse, among the medical profession. The outstanding need of the modern public health movement is not increased expenditures for scientific research, which is urgently needed, but increased appropriations with which the general public may be induced to make practical use of and receive the benefits from the scientific information which the medical profession has had in its possession for the past decade. Modern public health must replace misinformation and superstition with correct scientific information administered in a form that is both palatable and capable of being assimilated. The old order in public health, with its superstitions, false theories, shotgun quarantines and fumigation has been replaced in Mississippi by the new public health which depends for its complete fruition upon scientific data, common sense, and an enlightened public opinion. In public health, as in other lines of endeavor, the old adage that "nothing succeeds like success" is truly applicable. A successfully operating county health department is considered the most potent argument that can be utilized for inducing the contiguous counties to establish full time health service. It is upon these assumptions that the State Board of Health has striven to have executed in all of the full time counties a well rounded health program. The success of these efforts is revealed by the fact that on July 1, 1929, 35 per cent of the counties of the State, embracing 38 per cent of the total area, and 48 per cent of the total population of the State

had full time local health service and seven additional counties at the September meeting indicated their intention to join this class by including items in their annual budgets for full time health service.

It is not the intention of this paper to go into minute details of the operation of full time health work. However, there is given below a brief outline of the program of the major activities of a county health department:

PROGRAM OF ACTIVITIES OF A FULL TIME COUNTY HEALTH DEPARTMENT

1. Health Education
   (a) Lectures. (b) Motion pictures. (c) Bulletins. (d) Individual conferences. (e) Newspaper articles. (f) Personal and circular letters. (g) Exhibits, etc.
2. Sanitation
   (a) Private Homes
   General cleanliness
   Screening
   Water supply
   Excreta disposal
   (b) Public
   Schools
   Churches
   Factories
   Public buildings, hotels, etc.
   (a) Excreta disposal system
   (b) Water supplies
   (c) Light and ventilation, etc.
3. Food Supervision
   Inspection of all food vending and food producing places, such as dairies, pasteurizing plants, slaughter houses, meat markets, restaurants, lunch counters, ice cream and sausage factories, etc., and enforcement of rules and regulations pertaining thereto.
4. Epidemiology
   (a) 100% reporting by doctors
   (b) Case histories by health officer
   (c) Isolation of cases by health officer
   (d) Quarantine of contacts by health officer
   (e) Release of isolation and quarantine by health officer
   (f) Carriers and contacts sought by health officer
   Specials
   (1) Venereal Diseases
      (a) Examinations, Wassermann and Kahn
      (b) Prophylactics (questionable)
      (c) Treatment, only by doctors and approved clinics
   (2) Tuberculosis
      (a) Education
      (b) Examinations
      (c) Placed in institutions
      (d) Home visits, etc.
5. Immunology
   (a) Anti-typhoid—typhoid vaccine, three doses every three years
   (b) Anti-smallpox—vaccination, recently successful scar
   (c) Anti-diphtheria—toxin-antitoxin, three doses plus negative Schick
   (d) Anti-rabic treatments
6. Child Hygiene and Maternity
   (1) Prenatal
      (a) Examinations
      (b) Advise with parents
      (c) Home visits, nurse
   (2) Preschool
      (a) Examinations
      (b) Parents' visits to office
   (3) School
      (a) Examinations
      (b) School records
      (c) Home visits
      (d) Dental okehs
      (e) Health buttons
   (4) Nutritional classes
   (5) Corrective Measures
      (a) By physicians
      (b) By dentists, etc.
   (6 Supervision of midwives
   (7) Certificates from health officer to re-enter school after being a contact or having had a communicable disease
7. Laboratories
   (a) For diagnosis of communicable disease
   (b) For discovery of carriers
   (c) For release of quarantines
   (d) Analysis of drinking water
   (e) Analysis of milk (bacteria count, etc.)
8. Anti-Malaria per Anti-Mosquito Campaign
   (a) Surveys
   (b) Drainage
   (c) Oiling and larvicide
   (d) Home control, screening, breeding places, etc.
9. Life Extension
   (a) "Birthday," or annual examination, etc.
10. Vital Statistics
   (a) Births, making record and issuing registration certificates
   (b) Deaths, making record and issuing burial or transit permits, etc.

From this program it can readily be seen that an honest effort has been made to steer the public health workers clear of curative medicine. It is felt that there is more preventive work to be done than the workers at hand can possibly do in an acceptable manner. Mention is here made of an idea which is occasionally encountered among some members of the profession that public health activities should be confined to those who are unable to pay. It should be definitely understood that public health work should not be placed upon a charity basis. When there occurs a procedure wherein it becomes necessary to draw the line of demarcation between the rich and the poor it is safe to state that such a procedure does not belong in the realm of public health. The word "public health" means not the poor public nor the rich public, but the whole public, and all the activities of the full time county health department should be destined to benefit the entire public regardless of their ability to pay.

Results.—It is reasonably supposed that a conscientious execution of the program outlined above should be effective in reducing the incidence of and death rates from the more common infectious diseases. What, then, has been the result of full time health work in Mississippi? It is felt that Mississippi can modestly claim to have the best morbidity reports of any state in the Union. In 1926 the system of collecting morbidity reports of typhoid fever, scarlet fever, diphtheria, and smallpox on clinical report cards was inaugurated by the State Board of Health. During the years 1927 and

1928 reports of these diseases were received from approximately 98 per cent of the physicians of the State on these clinical report cards. The following tables indicate the case rates and death rates from these diseases for the part time and full time counties, respectively. In analyzing these tables the following facts should be borne in mind:

(1) That the system of reporting in the full time counties is undoubtedly more accurate than it is in the part time counties.

(2) The population in the full time counties is approximately 55 per cent colored, while in the part time counties the ratio between the black and white is approximately 50-50.

(3) That the full time counties embrace practically all large centers of population, a fact which favors congestion, which in turn means a more ready transfer of infection.

CASE RATES AND DEATH RATES PER 100,000 POPULATION IN THE FULL TIME AND PART TIME COUNTIES DURING THE YEAR 1927

	Total Pop. Full Time Counties, 601,435 Case Rates		Total Pop. Part Time Counties, 1,189,183 Death Rates	
	Full Time	Part Time	Full Time	Part Time
Diphtheria	72.21	100.28	8.13	10.75
Scarlet fever	52.95	58.71	.66	1.00
Typhoid fever	83.	92.14	10.12	16.29
Smallpox	8.63	26.54	.16	.25

CASE RATES AND DEATH RATES PER 100,000 POPULATION IN THE FULL TIME AND PART TIME COUNTIES DURING THE YEAR 1928

	Total Pop. Full Time Counties, 775,458 Case Rates		Total Pop. Part Time Counties, 1,015,160 Death Rates	
	Full Time	Part Time	Full Time	Part Time
Diphtheria	55.42	78.01	7.04	10.24
Scarlet fever	47.10	54.66	.76	.98
Typhoid fever	76.67	90.42	10.75	15.16
Smallpox	6.91	31.12	.12	0

From these tables it can readily be seen that the case rates and death rates from these diseases are considerably lower in the full time counties than they are in the part time counties. Of course, it is realized that a two year period is a rather short time for any definite conclusions to be drawn; however, these figures are interestingly suggestive that full time county health work has had some effect. Suffice it to say that the combined case rate of diphtheria, typhoid fever, smallpox and scarlet fever during 1927 was 34 per cent higher in the part time counties than in the full time counties and that the combined death rate from these same diseases was 44 per cent higher in the part time counties than in the full time counties during the same period.

CONCLUSIONS

As a result of the experience of the Mississippi State Board of Health for the past decade with the activities of and results accomplished by reasonably adequate full time county health departments, it is felt that the following conclusions can be drawn:

(1) Health problems are largely local and require local machinery for their solution. The full time county health department is the logical agency for efficiently performing this task.

(2) Adequate local health service is just as essential to the peace, happiness, and comfort of the citizenship of the county as are adequate educational or law enforcing facilities, and the expenditure of local funds for health protection is a just and wise business procedure.

(3) The state government, in order to insure adequate supervision and uniformly efficient service, should promote, foster and render financial assistance to this vitally important work, since the first duty of the state is to care for the health of its citizens.

(4) The efficiency of the work of a state board of health in the future will be judged, not by the size and activities of the central organization, but by the percentage of the people of the state who are adequately served by an efficient local health department.

DISCUSSION (*Abstract*)

Papers of Dr. Draper and Drs. Underwood and Applewhite.

Dr. A. T. McCormack, Louisville, Ky.—We say constantly that we should get a full-time health officer everywhere and minimize the expense; but it is difficult to do. Those of us who have lived through this campaign realize that far more than we have said.

The man in charge of the rural health work in the state and his assistants have most to do with determining which departments are going to survive; and it takes about one supervisor for each ten full-time health departments properly to coordinate their efforts and keep them effective.

We found no agency in Kentucky more helpful in keeping up the standards of our work than the quarterly meetings of the health officers in those particular sections. Once a year we have a week's school for our health officers where we all get together and for which we secure as strong a faculty as possible.

We are to consider the whole matter of coordination of Federal, state and local health agencies. Naturally the emphasis has been placed by the President on the early development of local health agencies. It is impossible to secure the necessary fundamental development of our state or national agencies until enough

persons in the Country have become acquainted with the value of public health work to see the importance of the necessary overhead. If we can begin to secure this cooperation in most of the states there will naturally develop, as there is developing, a demand for the additional personnel, emolument and recognition of efficiency on the part of health officials. Already in a few states 60 or 75 per cent of the population receive this health service. Our representatives in Congress and the Senate are going to view with approval the building of the necessary structure because the people will demand it.

I think two things should be kept very clearly in mind as we are developing this movement: first, we are on the brink of a great development, of which we have merely scratched the ground. Second: we are merely touching the fundamentals and essentials. The problem facing us is whether we are able, on the foundation already built, to erect the structure that will receive the endorsement of the American people, and through which we, as individuals, can be educated to the advance of modern public health administration and keep pace with it.

Dr. Noble A. Upchurch, Jacksonville, Fla.—It is a well known fact that the Bureau of Education with its seven cardinal principles considers the health of the child first.

We tell the people at home, and I have preached the fact at home, that a certain percentage of children are failing in school because of physical defects. You will find out just how much your county is losing by not having health work.

This is the point of attack, to establish county health units in Florida.

Dr. Roy K. Flannagan, Richmond, Va.—We realize very clearly in Virginia that there ought to be no cheap politics in our public health work. It should be established on a permanent basis and with an educational program and medical supervision. But in our sparsely settled counties medical supervision on a strictly county basis is a dream for the distant future, if we expect county governments to put up the money. It is possible only where there is a combination of political jurisdictions. Every one of our Virginia cities and counties is a separate jurisdiction and consequently if we are to effect a combination we must have politics in it. Whether we want it or not, we are in the middle of politics when we appeal for public support.

I wish that Dr. Underwood could have enlarged a little further on how to eliminate the politics. In discussing his plan he showed that he used some shrewd and sensible politics in carrying forward his own work.

When we have demonstrated clearly that our public health program is something that is essential to the well-being of the communities, we have gone a long way toward getting what we want from the politician. In Virginia we are finding it essential for political as well as economical reasons to use our trained medical health officers in just as large a territory as they can efficiently supervise, and multiply our sanitation officers and nurses to do the detailed work.

Dr. Lydia Allen DeVilbiss, Miami, Fla.—I wish to ask Dr Draper a question. I was surprised to hear the term "health officer." I think it is about ten years since I have used the word in connection with the full-time health unit. In speaking before the Medical Society and the various public organizations of this county I am using the term a "full time health unit" and "health director."

We think of a "health officer" as someone having to do with the legal quarantines; we think of a health director as one who is interested in educating his public. I wish to ask Dr. Draper if he has a better term than health director of a health unit.

Dr. W. A. Brumfield, Farmville, Va.—I am the man referred to as the "director" of the nine-county unit in Virginia. I have been in this unit for something like sixteen months. It is composed of nine counties, the population of which is 111,000, divided 50-50 between white and colored.

There is no question that it is a bigger unit than any one man can give adequate medical health services to; and yet I believe it is out of the question, in Virginia at least, for us to expect ever to have a whole or a complete health unit in each political unit of the state.

In one of these units is an old, proud county, with only about 8,000 population, 60 per cent negroes, and an assessed valuation of less than three million dollars. Already that county is making a per capita expenditure of 25 cents for public health. We know that they could do a great deal better than that, but they could not support a complete health unit, nor would so small a population justify it.

I had occasion some time ago to study the proportionate expenditure of the cities and the counties in Virginia. According to the best information I could get, Virginia has a per capital expenditure of $1.99 for public health work; in the counties there is a per capita expenditure of 8 cents, and in nearly 60 of the counties only 1 per cent is required by law to pay for registration of births and deaths. I think a county can well afford to make a higher expenditure than most of them are making, but suppose this little county with only about 3,000 white people were to go on up to $3.00 or $4.00. There still would not be enough money to conduct a well rounded health unit; so, it seems to me we have got to make some other arrangement to give health service to these counties.

Dr. Draper (closing).—Dr. McCormack has stated that the first county health unit was organized in Kentucky; these other county health departments are recorded in history, and Dr. McCormack's claim was made somewhat later. However, after he presents it a few more times it will become historical also and will perhaps become established.

The question of terminology of county health officers is an interesting one. The term "county health officer" is the first and oldest designation for a physician in charge of county health work. I suppose it was derived from the fact that the official in charge of state health work has been commonly known as a "state health officer."

The terms "county health department" and "county health organization" are of rather special interest just now. Recently we have recognized the need for designating the county health department plan of organization by some name that will be applicable throughout the country. We cannot apply the term "county health organization" to the entire country because over a considerable part of the country, the county either does not exist or else is not a suitable jurisdiction for one reason or another. In Massachusetts "union health districts" are discussed. They are contemplating com-

bining some of the towns into a "union health district," for health jurisdiction. In the South one can speak of county health organizations, but in the North the term is not applicable. As time goes on, perhaps some better term will be devised.

I think the designation of "county health director" is very good and where it is pleasing to the community, I see no reason for not using it.

Dr. Underwood (closing).—In any political division, it is necessary to have a thorough understanding at the outset with the constituted authorities as to the method and policies of organization, and the budget, to avoid trouble in the future.

INTUSSUSCEPTION: DIAGNOSIS AND VALUE OF EARLY OPERATION*

By HAROLD H. FOX, M.D.,
Miami, Fla.

"Intussusception is a disease produced by the passing of one portion of intestine into another, and it is commonly, I believe, from the upper passing into the lower part. All cases of intussusception are to be considered as progressive."

These statements made by John Hunter, in 1789, express our earliest recognition of this interesting pathological intestinal phenomenon. Intussusception is now characterized as an invagination of one portion of the intestine known as the intussusceptum into another portion known as the intussusceptiens. No portion of the intestine is immune to involvement. An overwhelming proportion of intussusceptions occur at the ileocecal junction, the extent of involvement in each case depending largely on the freedom of its mesenteric attachment and the strength of the peristaltic action. Approximately 75 per cent of the cases occur in children under the age of two years. Hospital reports vary widely as to its prevalence. Bettman reports that in 9,348 admissions to the Michael Reese Hospital in one year, three cases of intussusception were recorded. Hill states that between 1908 and 1917 there were 63 cases operated upon at the Massachusetts General Hospital. Strauss reports 24 cases operated upon at the Mt. Sinai Hospital, Cleveland, in the period of 1917 to 1927. My own experience has been limited to seven cases in the period from 1913 to 1928.

ETIOLOGY

The etiology of intussusception is obscure. Approximately twice as many male babies as female are affected. Seasonal variation seems to play no part. Hill states that over 50 per cent of his cases occurred in the months of June and July and that in no case was there a primary enteric infection. Vickers reports that his largest number of cases occurred during the months of December and May, and he thinks that the explanation is that many of the cases occurred during the festive season when indiscretions in diet are liable to occur. Hunter, in his original paper, explains the condition as follows:

"The manner in which it may take place is, by one portion of loose intestine being contracted and the part immediately below relaxed and dilated, under which circumstances it might very readily happen by the contracted portion flipping a little way into that which is dilated, not from any action in either portion of intestine, but from some additional weight into the gut above. The outer fold is the only one which is active, the inverted portion being perfectly passive and squeezed down by the outer, which inverts more of itself. So that the angle of inversion in this case is always at the angle of reflexion of the outer into the middle portion of the inverted one while the innermost is drawn in."

Many cases are associated with intestinal carcinoma, fibroma, polyps or diseased appendix. The association of intussusception with new growth of the intestinal tract is so frequent, especially in adults, that Santee emphasizes the importance of carefully examining the intestine for such growths, particularly in all cases involving the ileocecal region. I have been particularly impressed in my cases by the number in which a drastic purgative was given preceding the intussusception, and I believe that in children in whom the mesentery is abnormally long, permitting exceptional movement of the intestinal tract, such cathartics by producing violent peristalsis may play a part in inducing the intussusception.

Trophic influences may act as etiological factors also by producing paralysis of portions of the bowel through their action upon the splanchnic nervous system controlling the plexuses of Meissner and Auerbach as demonstrated by Bayliss and Starling. Alvarez, in his recent work on intestinal peristalsis, has shown that normally in rabbits intussusception depends upon the contraction of the lower portion of the bowel upon an upper segment and this contraction ring is induced by a foreign body in the upper portion. In cases of ileocolic intussusception the foreign body which initiates the peristalic contraction resulting in invagination may be hypertrophy of lymphoid tissue about the end of the ileum as pointed out by Hypsley.

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*Clinic, General Clinical Session, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

SYMPTOMS

The onset is usually sudden, the child crying out with pain. At first the face is flushed, especially during the paroxysm of pain. Later, it becomes pale and drawn. The temperature is normal or subnormal, except where some intercurrent infection produces a pyrexia. The pulse is rapid and often thready in character. The child frequently lies on its side with thighs flexed on the abdomen. Finney states that during the paroxysms of pain the child will crawl about the bed on its hands and knees and considers this sign, when present, pathognomonic of intussusception. Where shock is present the skin is cold and covered with a clammy perspiration. The abdomen usually shows little if any distention. In many cases it is quite flat and relaxed. There is moderate tenderness over the intussusception. Later there may be considerable distention, especially in the upper abdomen. The respiration often is shallow, rapid and thoracic in type. Vomiting is an early but inconstant symptom. There is usually one bowel movement shortly after the onset in many cases. If the abdomen is closely observed peristaltic waves may be observed in the upper abdomen, stopping at the area of invaginated bowel. Subsequent bowel movements are small and consist in the early stages of mucus or blood stained mucus. Intestinal bleeding usually occurs in from nine to twelve hours after onset. Many writers stress the importance of rectal examination and state that the finger in the rectum will detect a tumor mass low in the pelvis. In the cases which have come under my observation, I have not found this to be true in any case, and I believe it to occur only as a very late symptom. As the hand palpates the upper abdomen after the intussusception is well established, a firm, elongated tumor is felt lying transversely or diagonal to the long axis to the body, at the level of the umbilicus or slightly above it and beneath the outer border of the rectus muscle. Very early the tumor may be mistaken for the lower border of the liver. There is usually slight spasm of the rectus muscle over this area. The first manifestation of intestinal bleeding may be a free gush of clear blood following the introduction of the finger into the rectum, or blood will be found in the rectal irrigations. In spite of the severity of the condition the child may appear normal or playful between the paroxysms of pain. If the obstruction becomes complete, death usually ensues in from two to three days to one week. Cases with incomplete obstruction may live several weeks. Where the obstruction is complete, unless it is relieved by medical or surgical measures or by a natural sloughing of the bowel with restoration of its lumen, death always ensues, usually from exhaustion, since peritonitis is an infrequent complication.

DIFFERENTIAL DIAGNOSIS

Pathological conditions most frequently confused with the diagnosis of intussusception are gastro-enteritis, or colitis, enlarged mesenteric glands. Henoch's purpura, *prolapsus in ano,* or rarely the lower border of the liver is mistaken for the tumor of intussusception. In gastro-enteritis or colitis the onset may be as sudden as in intussusception, but in intussusception after the first bowel movement has passed there is usually obstruction and the bowel irrigations bring away only blood and mucus, whereas in gastro-enteritis or colitis the rectal irrigations show particles of feces in addition to the blood and mucus. In an advanced case of colitis or Henoch's purpura the colon is often felt as a hard, elongated mass more or less fixed. In intussusception the tumor palpated is usually freely movable and the outline of the tumor in intussusception is much more definite than the indurated colon in colitis. The tumor in the rectum can never be palpated in colitis or Henoch's purpura.

In *prolapsus in ano* if one will recall Hunter's statement, "In prolapsus the point of inversion is always at the extremity of the protrusion," there need be no difficulty in confusing this condition with intussusception. Enlarged mesenteric glands are fixed in position. In intussusception of the ileocecal type the tumor often resembles in location and consistency the lower border of the liver. In such cases it is often necessary to anesthetize the patient to determine whether or not a tumor really exists. As a means of differentiating all these conditions from intussusception a barium enema with an examination under the fluoroscope and x-ray pictures will be found of the utmost value.

DIAGNOSIS

The diagnosis is established upon the following points: first and most important, a carefully taken history from the mother of the symptoms which she has observed (2) the finding on physical examination of a more or less freely movable abdominal tumor; (3) blood passed by rec-

tum, either mixed with feces or as a free hemorrhage or found in rectal irrigations; (4) vomiting; and (5) a rectal tumor. The child evidences paroxysms of pain with normal interludes, a more or less relaxed abdomen, apparently moderately tender only over the tumor area. Negative blood and urine pictures and lastly the determination of intestinal obstruction by use of the barium enema, fluoroscopic findings and the x-ray pictures.

TREATMENT

The treatment may be divided into three plans: (1) expectant; (2) medical; and (3) surgical. The expectant looks for relief in two ways: (1) separation of the intussusception by reverse action of the peristaltic wave from that which produces the intussusception; (2) by sloughing of that portion of the intussusception producing the obstruction. It is possible to conceive that in that rare form of intussusception known as retrograde where the lower portion is invaginated into the upper portion, peristalsis may free the obstruction. For obvious reasons we have no definite statistics bearing upon the proportion of intussusceptions freed by such peristaltic action. As regards the reduction of intussusception by natural sloughing of the bowel, Thompson is authority for the following quotation:

"Walton reports 239 cases with spontaneous elimination in one case. Fitzwilliam in 1908, in a series of 1000 cases, does not mention a single case undergoing spontaneous elimination. Four hundred cases reported by Perrin and Lindsey failed to show a single case of spontaneous elimination. Thus it may be seen that the hope that the bowel will, through natural action, eliminate the obstructing portion is slight indeed, and for these reasons resorting to expectant treatment should be mentioned only to be condemned."

Medical treatment consists of attempts to reduce the intussusception (1) by manipulation; (2) by introducing a foreign object such as a rubber catheter into the rectum and pushing the intussusceptum out of the intussusceptiens by applying pressure to the catheter; (3) by introducing air into the rectum under varying degrees of pressure; (4) by spinal anesthesia; (5) by giving purgatives or emetics; (6) by hydrostatic pressure with or without manipulation; (7) by barium enemas with fluoroscopic control. Recent reports of relief of intestinal obstructions through the use of spinal anesthesia are very encouraging, but there is not sufficient data properly to estimate the worth of this method in intussusception. The other measures, with the exception of hydrostatic reduction alone or in conjunction with fluoroscopic control, seem to have been universally condemned as being too uncertain in their results and too liable further to injure an already damaged intestinal wall. Retan with one successful experience advises the use of a barium enema with the bag at an elevation of four feet and bimanual application of pressure to the lower abdomen under fluoroscopic visualization. He states that the method should not be used after the first twelve hours, since after that time the bowel will be so damaged or adhesions so dense as to render it inpracticable. He also states that vomiting should cease as soon as disinvagination is complete. Otherwise, a laparotomy should be performed. Stephens, whose conclusions are based on two cases of successful reduction of ileocecal intussusception with barium enemas under fluoroscopic control, advises immediate operation if efforts to reduce by manipulation and enema are unsuccessful, but fails to state what constitutes satisfactory evidence of complete reduction other than the general statement that "there need be no doubt about the reduction in most cases."

Wabasse states that attempts should be made early to reduce the intussusception by means of enemas, but in all cases a laparotomy should be performed since it is only by doing a laparotomy that one can be definitely assured that the obstruction has been completely reduced. Hypsley, who reports the largest number of cases treated by hydrostatic pressure, is the main exponent of this method of reduction. He reports 100 consecutive cases of intussusception treated by hydrostatic pressure in which he completed a satisfactory reduction in 44 cases. In 18 others of this series he effected a complete reduction, but in order to be sure of his results he did a laparotomy as well, so that he found it necessary to operate upon 56 out of one hundred cases. Furthermore, upon one of the cases treated by hydrostatic pressure he found at autopsy that the bowel had been ruptured, and he states:

"I foolishly, in this case, contrary to my usual practice, palpated the abdomen while it was distended with the fluid, thereby increasing the pressure to a degree impossible to determine and causing a perforation. The accident certainly would not have occurred if the pressure had been limited to that of a column of water one meter high."

He particularly emphasizes that in no case should the column of water be over 3 feet 6 inches high, yet, as has already been stated, Retan advises that the bag be at an elevation

of four feet, and both Retan and Stephens advocate manipulative measures which Hypsley strongly condemns. Hypsley's mortality rate for this series is 5 per cent, which is very low. It must be remembered, however, that he did operate upon over half of his series of cases. In comparison with his mortality of 5 per cent he quotes Vickers of the Royal Alexandria Hospital with a mortality rate of 14.34 per cent in 400 cases treated by operation alone. He fails to state that Vickers for 75 consecutive cases operated upon had a mortality rate of 6.6 per cent, and in 1922 reported 48 cases operated upon with a mortality rate of 6.2 per cent. Weiss reports 322 cases, 177 of which were treated without operation, showing 84 per cent deaths. With primary laparotomy there were 39 per cent deaths. Gibson, according to Wabasse, states that in 187 operative cases, of the cases operated upon the first day 37 per cent died, on the second day 39 per cent, on the third day 61 per cent, fourth day 67 per cent, fifth day 73 per cent, and on the sixth day 75 per cent. Strauss's report of Ladd and Cutler's statistics show that out of 20 cases operated upon in 12 hours 5 per cent died; of 22 cases operated upon in 24 hours, 18 per cent died, and of nine cases operated upon in 36 hours, 47 per cent died. We may thus appreciate that an early diagnosis and early operation are of prime importance in reducing the mortality rate, since it has been shown that except for operation we have no certainty of knowing when the intussusception is reduced.

OPERATION

A general anesthetic is the one of choice for the operation, due to the fact that it is impossible to determine beforehand the involvement or extent of injury to the bowel. Morphine should be given sparingly, if at all, and the operation should be performed as rapidly as possible, since infants do not tolerate opium products or stand shock well. An incision should be made directly over the tumor. This incision should be a muscle splitting one from 3 to 4 inches in length, to give free access to the abdominal cavity. Upon opening the abdomen a hurried examination should be made of the bowel to determine the extent of the invagination, the structures involved and the degree of injury to the bowel. If the intussusception has persisted for more than four hours adhesions will often be found varying in strength, depending upon the time that has elapsed since the invagination has occurred. If the case is operated within the first twenty-four hours, these adhesions are usually easily separated. The importance of gentle manipulation cannot be over-stressed, since the bowel wall is always devitalized to a certain extent. If the condition has persisted twenty-four hours or longer gangrene of the intestinal wall is a frequent occurrence. In such cases one must decide whether to resect the bowel, do an end to end, or a lateral anastomosis, or if the patient's condition is so critical that sufficient time cannot be taken for such operative measures the diseased area may be brought out of the abdominal wall, the healthy bowel attached to the peritoneum with a few sutures to wall off the peritoneal cavity and the diseased bowel opened and drained, to await an intestinal resection at a more favorable time. Upon completion of the operation there is no assurance that the condition may not recur. If the mesentery of the involved area seems particularly long it may be plicated. Care should be taken in applying the sutures not to inclose any of the mesenteric blood vessels. The intestinal wall of a very long or a very freely movable colon or the ileum may be attached to the abdominal wall with a few sutures of fine gut. If a diseased appendix, intestinal polyp, Meckel's diverticulum, or other intestinal anomaly is thought to be the etiological factor in producing the intussusception, these should be removed, provided the patient's condition warrants the additional operation. Upon the completion of the operation, to counteract dehydration, it is well to pour 500 c. c. or more of warm normal saline solution into the abdominal cavity and close the abdominal incision without drainage. Two layers of suture are usually sufficient for this purpose: a through and through suture which takes in peritoneum, fascia and muscles and a superficial suture uniting skin and subcutaneous tissues.

THE AFTER-TREATMENT

As previously stated, infants do not stand shock well and after-treatment should be especially designed to counteract or alleviate this condition. Artificial heat should be applied to keep the body warm; fluids, such as 10 per cent glucose in normal saline, should be given freely by the intraperitoneal route, by hypodermoclysis or by proctoclysis and by mouth as soon as they can be tolerated. Strong coffee added to the dextrose saline solution given by rectum is a valuable adjunct to prevent collapse and to stimulate the kidney function. To insure rest it is

better to rely upon sedatives by rectum than upon the hypodermic use of morphine or other opium derivatives. Blood transfusions are of proven value. In the postoperative care of the patient a trained pediatrician should cooperate, since the necessity for proper feeding in such cases cannot be over-estimated. The prognosis in cases of intussusception is always grave, particularly in cases requiring resection.

SUMMARY

In conclusion, I am of the opinion that the best results are achieved in the treatment of intussusception by, first, an accurate diagnosis and second, an early operation.

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THE DUODENAL ULCER CRATER*

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The Roentgen diagnosis of duodenal ulcer has become one of the most accurate diagnostic procedures available at the present time. Lewis Gregory Cole, in 1914, first described bulbar deformity as indicative of duodenal ulcer, and this sign has since been accepted by all men doing gastro-intestinal x-ray work. As deformity of the bulb is really an indirect sign of ulcer, it has proved to be accurate chiefly because ulcer is almost the only lesion found in the first part of the duodenum. Haudek, in 1911, was the first to recognize the duodenal niche. He mentioned its appearance as a small spot of bismuth, not affected by palpation. This suggests that he used the same technic described by later investigators, in which a small fleck of barium is seen in the ulcer crater during palpation of the barium filled duodenum.

Akerlund, more recently, has reported the demonstration of craters in 60 per cent of his cases of duodenal ulcer. These figures have been approached only by Diamond, who, in 1925, reported a small series in which the crater was seen in 66 per cent. Carman and Sutherland, in 1926, report an excellent study of this phase of Roentgen diagnosis, with a demonstration of ulcer craters in 13.27 per cent of a large series of cases. This is a relatively low figure, as compared with those of Akerlund and Diamond, but is explained by the fact that no special effort was made to find a crater if characteristic deformity of the bulb made the diagnosis obviously duodenal ulcer. The accuracy of this work was proved by surgical findings in 100 cases in which an ulcer crater was reported. Craters were found in 98 cases, and in the remaining two, the Roentgen diagnosis was not proved incorrect, as the duodenum was not opened for complete exploration.

The following report is based on a study of the records of 241 consecutive cases in which a positive Roentgen diagnosis of duodenal ulcer was made. In this series, some special effort was made to demonstrate ulcer craters, chiefly by palpation as described in the report of Carman and Sutherland. This consists of compression of the barium filled duodenal bulb, attempting to catch a small amount of barium in the ulcer crater, which shows as a circumscribed dark area, commonly called a "fleck," on the fluoroscopic screen when the walls of the duodenum are approximated. This is, of course, the same technic that is used in demonstrating posterior wall gastric ulcers which are too far from the curvature to be seen in profile. Care must be used to differentiate the true fleck of an ulcer crater from (1) a small amount of barium caught in the pyloric ring; (2) barium in one of the diverticulum-like pouches of a markedly deformed bulb; and (3) barium in the second and third parts of the duodenum. This differentiation is not difficult, and when a fleck is demonstrated repeatedly by palpation during the screen examination, a diagnosis of duodenal ulcer can be made without hesitation, regardless of other evidence of the lesion.

The visible niche, as commonly seen in gastric ulcers on the lesser curvature, is a much less reliable sign of an ulcer crater in the duodenum. Frequently there are multiple niche-

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Fig. 1
Visible ulcer crater, of the "fleck" type.

Fig. 3
Visible ulcer crater, of the "niche" type.

like projections along the margins of the bulb, any one of which might be taken for an ulcer, usually incorrectly. Most ulcers are on the anterior, and less frequently the posterior wall, involving the curvatures only when the craters are large enough to extend to them from other parts of the duodenal wall.

In the series of cases reported here, there were 43 with operative findings. In 33, the lesions were situated on either the anterior wall or the posterior wall, or both. In one case, there was an ulcer on the lesser curvature side of the bulb, and another ulcer on the greater curvature. One annular ulcer was found. In the remaining eight cases, the position of the lesion was not indicated. Carman and Sutherland report 98 cases, in 83 of which the ulcers were on the anterior and posterior walls. In the remaining 15, the position was not shown in the operative report.

This suggests a criticism of the statistics reported by Akerlund and by Diamond. In almost all of their cases, niches were demonstrated along the lesser curvature margin of the bulb. As ulcers are seldom found in this position, it seems probable that niche-like projections fre-

Fig. 2
Visible ulcer crater, of the "fleck" type.

Fig. 4
Perforated duodenal ulcer. Niche and accessory pocket at upper limit of duodenal bulb.

Fig. 5

Duodenal bulb normal in contour. Fleck type of ulcer crater demonstrated during fluoroscopic examination. In the original film, the barium-filled crater could be distinguished near the greater curvature margin of the bulb.

quently seen in bulbar deformity were called craters in some of their cases.

This possible source of error is entirely eliminated when demonstration of a fleck by palpation is required, but the percentage of demonstrable craters is considerably reduced. In our series of 241 cases, in which a diagnosis of duodenal ulcer was made, craters were reported in 61, or 25.3 per cent. In all but one of these

Fig. 7

Slight deformity of lesser curvature margin of bulb, close to pylorus. Ulcer crater demonstrated during fluoroscopic examination.

61 cases, the craters were demonstrated by palpation during the fluoroscopic examination, and were of the "fleck" type as described above. In almost all, the fleck was seen approximately midway between the curvatures of the bulb. Occasionally a marginal niche could be shown also in the oblique positions. However, when the characteristic fleck was found, no special search for a niche was made.

Fig. 6

Duodenal bulb normal in contour. Ulcer crater demonstrated during fluoroscopic examination.

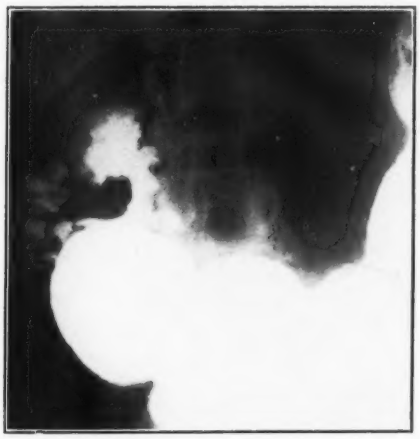

Fig. 8

Markedly deformed bulb due to an annular ulcer. The film showed multiple niche-like projections, but a crater could not be identified.

The one case in which a crater was reported without demonstration of a fleck was that of a patient who showed a perforated ulcer, with a rather large accessory pocket outside the duodenum, and a subphrenic abscess. The diagnosis was obvious, and of course no manipulation was attempted.

In a number of additional cases, the niche type of deformity was seen, but no fleck could be demonstrated, and the examiner refused to report an ulcer crater. All of these were seen in markedly deformed bulbs, and were on the curvatures, adding further proof that they would have been considered craters incorrectly.

In seven of the 61 cases, the first part of the duodenum filled normally, with no evidence of deformity in contour. But palpation during the screen examination revealed a constant centrally located fleck in each instance, and a positive diagnosis of duodenal ulcer with a crater was made. In this group the fleck was the only definite evidence of the lesion. In an additional group of six cases, there was very slight deformity of the bulbar margin. A diagnosis of ulcer would have been made with some hesitation, if the presence of a fleck had not relieved us of all doubt. In the remaining 48 cases, there was a definite deformity of the bulb, as well as a demonstrable crater, so that the fleck was a less valuable aid than in the first two groups.

Of the entire 61 cases in which craters were reported, operative findings were obtained in nine. The value of the fleck type of deformity is proved by the fact that ulcers were found in all nine cases, just as noted in the x-ray report. Four of these deserve special mention.

In the first case, Roentgen examination of the patient showed a duodenal bulb entirely normal in contour, but palpation during the fluoroscopic study revealed a constant centrally located fleck. A diagnosis of duodenal ulcer with a crater was confirmed by operation, when an anterior wall ulcer, with a crater 3 mm. in depth, was found.

The second patient presented slight deformity of the first portion of the duodenum, with a demonstrable fleck. At operation, a small dimple, due to the scar of a healed ulcer, was noted on the anterior wall of the bulb. Because a crater had been found during the Roentgen examination, the duodenum was opened, and a punched-out ulcer on the posterior wall was revealed.

In the third case, two flecks were seen, with slight deformity of the bulb, and a Roentgen diagnosis of multiple duodenal ulcers was made. Surgical exploration revealed two ulcers on the anterior wall of the duodenum, corresponding in position to that of the flecks seen during the screen examination.

In the fourth case, Roentgen study of the patient showed a deep niche-like projection along the superior border of a markedly deformed bulb. Barium was retained in the niche when pressure was applied over this part of the duodenum. Because of the depth of the niche, and the large size of the fleck, a diagnosis of perforated ulcer was made. At operation, a large annular ulcer was found. The Roentgen report of perforation was ignored, and a gastro-enterostomy was done without complete exploration of the duodenum. An autopsy later revealed a perforation through the posterior wall, with an incompletely walled-off abscess at the site of perforation.

In the group of 180 cases diagnosed duodenal ulcer without evidence of a crater, there were 33 with surgical findings. Two of these 33 proved to be errors in Roentgen diagnosis. No ulcers were found, but there were adhesions between the gall bladder and the duodenum, which explained the bulbar deformity in both cases.

Nine proven cases, in which ulcer craters were found by x-ray examination and confirmed by operation, is of course a relatively small series upon which to base conclusions. But the close correspondence between Roentgen and operative findings in this group indicates that the demonstration of a duodenal fleck justifies an unqualified diagnosis of duodenal ulcer. Its greatest value lies in that group of cases in which there is little or no deformity in the contour of the bulb. Here the finding of a crater by palpation during the fluoroscopic examination makes possible a positive diagnosis of ulcer, regardless of the lack of other Roentgen signs of the lesion.

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DISCUSSION (*Abstract*)

Dr. C. H. Heacock, Memphis, Tenn.—Bulbar deformity is influenced by two kinds of factors: (1) those with an organic basis, and (2) those with a functional basis. The organic basis for the deformity may be the crater itself, inflammatory induration, cicatricial contractions, or pouch-like formations. Most of the deformity, as we see it on the fluoroscopic screen or in the roentgenogram, is due to spasm. As Dr. Harding has said, any one or none of these pseudo-niches produced by spasm may be the crater. Diamond was able to differentiate many of the pseudo-niches from the real crater by giving large doses of belladonna. Personally, I have not been successful in relieving intrinsic spasm by belladonna, but have never followed Diamond's technic. He gave 20 drops four times a day for four days and supplemented the belladonna by large doses of sodium bicarbonate.

Dr. Harding emphasizes the value of the fleck as a true index of the crater. I agree with him and never report the examination of the duodenum as negative, without apposing the walls of the duodenum and trying to demonstrate a fleck. I have had the report of duodenal ulcer confirmed many times when the only Roentgen sign of ulcer was this persistent fleck.

The practical point to be obtained from this paper is this: when we have found a persistent fleck, and at operation the surgeon fails to find an ulcer on the anterior wall of the duodenum, we can be more insistent that he open the duodenum and carefully explore the posterior wall.

Dr. F. K. Herpel, West Palm Beach, Fla.—During the past fall I was in the laboratory of a prominent Roentgenologist, and noticed that in his gastro-intestinal cases an unusual number of films were being taken in each case. Commenting on this fact, I was informed that he was no longer routinely fluoroscoping these patients, but was relying largely upon film examination. I was much surprised to find a prominent man, from whatever cause, seeming to abandon what I consider the most important part of a roentgenologic examination of the gastro-intestinal tract. I think a note of caution might well be inserted here relative to the abandonment of this vital part of an accurate examination.

Dr. Harding (closing).—I believe that many so-called niches, seen on the greater and lesser curvature margins of the duodenal bulb are due to spastic deformity, rather than to actual craters. Diamond gave atropine to relax the duodenal spasm in his cases, but in my experience it is usually impossible to obliterate all spasm in the bulb when an ulcer is present. Because of this, I seldom use atropine in the study of duodenal lesions, feeling that bulbar deformity, when present, is sufficient indication of the presence of a duodenal ulcer.

The value of fluoroscopy in the Roentgen diagnosis of lesions in the gastro-intestinal tract is established beyond any question of doubt.

DIVERTICULA OF THE THORACIC PORTION OF THE ESOPHAGUS*

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C. H. Mayo[10] gives Rokitansky credit for originating the terms "pulsion" and "traction" in describing diverticula of the esophagus. These terms have not been improved upon, but the term "traction-pulsion" has been used to describe a third type, a traction diverticulum that is made larger by the increased pressure within the sac. The pulsion type arises as the result of some congenital weakness within the esophageal wall plus some factor increasing intra-esophageal pressure. The traction type develops as the result of the contraction of inflammatory adhesions, which are usually the result of a suppurative lymphadenitis. For this reason, they generally occur in the middle third of the esophagus. Pulsion diverticula may occur at any level of the esophagus, but are most commonly seen in the pharyngo-esophageal region. Most of the diverticula in the lower third belong to this type. Pulsion undoubtedly plays a part in a few traction diverticula, especially if they become large. Judd[8] estimates that this conversion occurs in 7 per cent of cases.

Prior to the advent of the Roentgen ray, with one or two exceptions, diverticula of the thoracic esophagus were found only at post-mortem examinations. Reitzenstein[13] was probably the first to employ the Roentgen ray in the diagnosis of a deep seated diverticulum in 1898, and he used the Roentgen ray to confirm rather than to make the diagnosis. Since 1898, nearly all the cases reported in the literature have been discovered during the Roentgen examination. Carman's[3] description of deep seated diverticula in 1919 was based upon fourteen cases. Up to 1928, L. A. Smith[14] was able to collect 27 more cases from the literature and add nine cases of his own. Since then cases have been reported by Sturgeon,[16] M. K. Smith,[15] Fitzgibbons,[5] Van den Wildenberg,[17] Muhlman[11] (two cases), Herrnheiser,[7] and by Barsony and Polger[1] (26 cases). Two cases of diverticula of the lower third of the esophagus have been seen

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Fig. 1
Solitary diverticulum 5 cm. from the cardia. No symptoms referable to the esophagus.

at the Polyclinic. This totals 85. Some cases, reported from post-mortem examination, are not included in this number. Some references in foreign literature could not be obtained. Doubtless many have been observed and not reported. However, they are found so infrequently that their discovery always excites interest.

CASE HISTORIES

Case 29479, a man, aged 43, came to the Polyclinic in April, 1928, complaining that for the past five or six years he had been suffering from attacks of fullness after meals, qualitative food distress, and other symptoms commonly associated with disease of the gall bladder. There was no difficulty in swallowing nor other symptoms referable to the esophagus.

In the course of an x-ray examination of the gastro-intestinal tract, a small diverticulum was found on the left side of the esophagus about 5 cm. from the cardia (*see Fig. 1*). No diverticula were found elsewhere in the alimentary tract.

The finding of the diverticulum was considered incidental by the clinicians who made a diagnosis of cholecystitis. At operation, both the gall bladder and the appendix were found to be badly diseased, and were removed.

Case 27791, a woman, age 54, during the preceding fifteen years had had six attacks of epigastric colic. Occasionally she had noticed that water regurgitated when she drank it. There were no other esophageal symptoms.

During the ingestion of a barium meal in the gastro-intestinal examination, three small diverticula were found in the lower third of the esophagus (*Fig. 2*). There was slight delay in the emptying time of the esophagus. No other diverticula were found in the gastro-intestinal tract and the examination was otherwise negative.

She was put on medical management and the diverticula were disregarded.

Neither of these patients was subjected to esophagoscopic examination. Vinson[18] warns against routine esophagoscopy in cases of diverticula. The Roentgen examination usually gives all the information necessary. Frequently even the type of diverticulum may be determined. A study of the roentgenograms of traction diverticula reveals that they are usually more or less cone-shaped with the bases directed toward the lumen. There is little tendency for the formation of a neck and retention of food or barium, unless they are complicated by cardiospasm. These traction diverticula have been

Fig. 2
Multiple diverticula in the lower third of the esophagus. Patient experienced difficulty in swallowing liquids.

found by the pathologist to contain all the layers of the esophageal wall.

On the other hand, pulsion diverticula are found to be hernias through the muscular coats and are covered only by the serosa, mucosa and submucosa. They usually have rounded or oval contours on the roentgenogram and are constricted at their bases. Their lack of musculature and narrowed necks favor retention. This tendency is more marked as they increase in size. Both of these cases probably belong in the classification of the pulsion type. This is suggested by their contour and location. Most of the traction diverticula occur in the middle third. These are in the lower third and below the level of the tracheobronchial lymph nodes.

Another interesting feature of one of these cases is the presence of multiple diverticula. Warthin[19] mentions the possibility of multiple sacculations, but only three reported cases were found in the English literature, one by Buckstein[2] and two by L. A. Smith.[14] These were in the middle third and were probably of the traction type. Multiple inflammatory areas with adhesions and cicatricial contractions are easier to understand than multiple areas of congenital weakness in the wall. The latter seems the most commonly accepted theory for the formation of the pulsion type. Cases of multiple sacs are more numerous in the German literature. Haudek[6] and Peltsohn[12] each report one case. Barsony and Polger[1] report four cases, most of which belong to a type which they call functional.

Functional diverticula (Barsony) are small sacs seen only at the time of a peristaltic wave and in the vicinity of the contraction. After the wave is past, the borders of the esophagus become normal again. These are quite small but capable of enlargement and may come to have an anatomic basis. Occasionally they have been seen to grow smaller. Barsony believes that they are caused by a disturbance of innervation, reflex from some lesion in the vicinity, usually in the stomach.

Of course, these small functional diverticula are symptomless. But have the anatomic diverticula any clinical significance? The diverticula were disregarded clinically in my two patients. Only one of the patients (*Case II*) presented symptoms referable to the esophagus. One month ago she returned at our suggestion and stated that she still had difficulty in swallowing liquids, which seemed to stop under the sternum. The difficulty had not increased during the intervening thirty months. The Roentgen examination showed no increase in the size of the sacs and no more delay at the cardia than at the original examination. The clinician evidently was justified in advising her to disregard this Roentgen finding.

The history of the second patient suggests cardiospasm and Dessecker[4] believes that a history of cardiospasm can always be obtained in these patients. This contention is not substantiated by a review of the literature. Only about one-third of the patients with deep seated diverticula have a co-existing cardiospasm. The incidence of a concomitant cardiospasm is fairly high if only the pulsion type is considered. A dilatation then usually relieves the patient. Probably the cardiospasm is usually primary and the cause of the diverticula. However, it is possible that occasionally the diverticulum may be the source of the irritation that causes the spasm. The diverticulum seems to have been the original lesion in one of the cases reported by Barsony and Polger[1] and in one of the cases of Kaufman and Kienbock.[9] It has been suggested that pulsion diverticula of the lower third, since they are secondary to congenital weak places in the walls, may be an index to congenital defects in this area. Only three cases were found in which the associated pathological conditions seemed to suggest this. These were two cases of diaphragmatic hernia reported by L. A. Smith and one by Herrnheiser, although the latter was of the traction type.

M. K. Smith[15] collected four cases from the literature in which the symptoms might be ascribed to the diverticula. These were not especially convincing, but they are at least suggestive and should not be wholly disregarded. After reviewing all the cases, the conclusion seems to be warranted that the clinician is usually justified in regarding these diverticula of little clinical importance. Their chief interest still rests with the anatomist and roentgenologist.

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DISCUSSION (*Abstract*)

Dr. P. P. Vinson, Rochester, Minn.—These are beautiful pictures of multiple diverticula. I have seen a few cases of diverticula just above the cardia; I showed you one in the middle third of the esophagus, associated with cardiospasm. I am inclined to believe that the diverticulum developed secondary to the cardiospasm. These cases are remarkable.

INFLAMMATORY LESIONS OF THE CERVIX*

By DEWELL GANN, JR.,
AM., M.D., D.Sc., F.A.C.S., F.R.C.S. (Edin.),
Little Rock, Ark.

For a number of years I have been studying the cervix from different angles, but today I wish to call your attention only to methods of treating its inflammatory lesions, based upon what I think is a sound pathological foundation. In presenting these slides, I shall attempt to show you semi-diagrammatically, by means of micro-photographs and drawings, what seems to occur as an inflammatory state progresses and how each inflammatory lesion is best treated. There is, however, a condition we occasionally see which closely resembles a simple erosion, the so-called pseudo-erosion.

If we recall for a moment the embryology of the gynesic system we remember that the squamous epithelium has replaced the columnar epithelium in the vaginal vault by the end of the sixth month and there is a line of demarcation between the two at the external os, but in some instances the columnar epithelium remains on the portio. This area is of variable dimensions. The blood vessels shine through and except for the absence of inflammatory evidences we have a simple erosion. The lesion, however, is truly of congenital nature and should not be confused with the simple erosions seen in what I have chosen to call the cervicitis of childhood, a much more common malady than has ever been suggested, a condition, though the hymen is intact, that should be more generally sought for and recognized.

Acute lesions of the cervix heal rapidly and soon become chronic when various inflammatory changes may be seen throughout the organ as a whole. Shortly following the acute lesion, characterized by swelling and engorgement, there is an abnormal multiplication of the columnar cells first of the cervical mucosa. With this hypertrophy and hyperplasia something must happen in the cervix just as in other tissues when inflammation occurs. Rubor, calor, dolor and tumor are present in the cervix when it is invaded by a micro-organism, be it streptococcus, staphylococcus, colon bacillus, or gonococcus, in the same degree of intensity as in

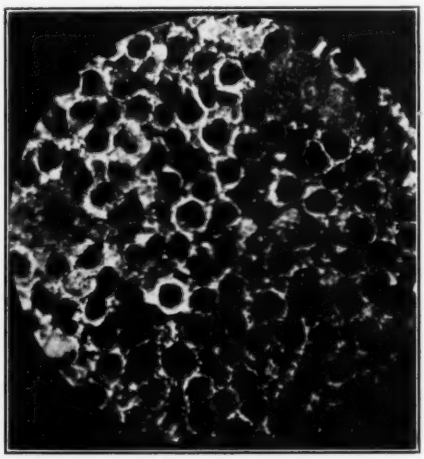

Fig. 1
Smear from virginal cervix, hymen intact. A physician's daughter, admitted with acute bilateral pyelitis without history suggestive of cervicitis.

*Read in Section on Gynecology, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

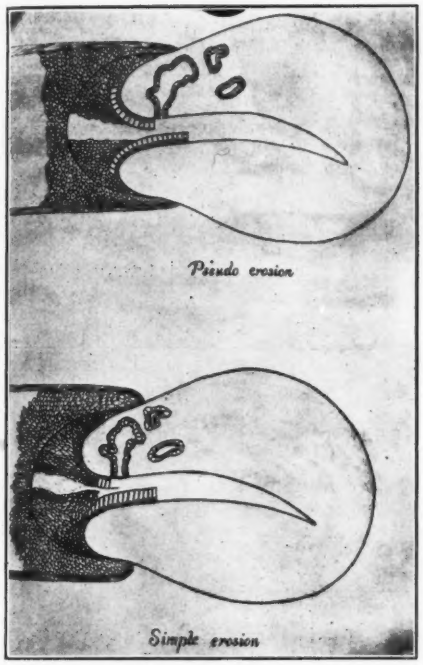

Fig. 2
Note the sharp line of demarcation between the squamous and columnar epithelium in pseudo-erosion and how the columnar epithelium slips under the squamous epithelium in simple erosion.

Fig. 3
The squamous epithelium is shed in simple erosion, leaving only the columnar epithelium.

other soft parts which react to the same bacteria.

In hyperplastic conditions in any glandular structure the new cells follow the lines of least resistance in their processes of extension. In the cervix we have chosen to describe four such lines. The first is from the canal to the portio. The columnar cells pass from the canal onto the portio in such a manner that in their downward growth the squamous cells covering the vaginal portion of the cervix are lifted and shed. This is the first line of least resistance. Clinically at this time the cervix presents a reddened area of variable dimensions about the

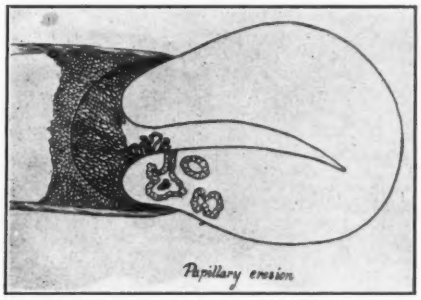

Fig. 4
The epithelium piles up on the portio of the cervix in papillary erosions.

Fig. 5
Note the tuft-like papillae as shown microscopically in the papillary type of erosion.

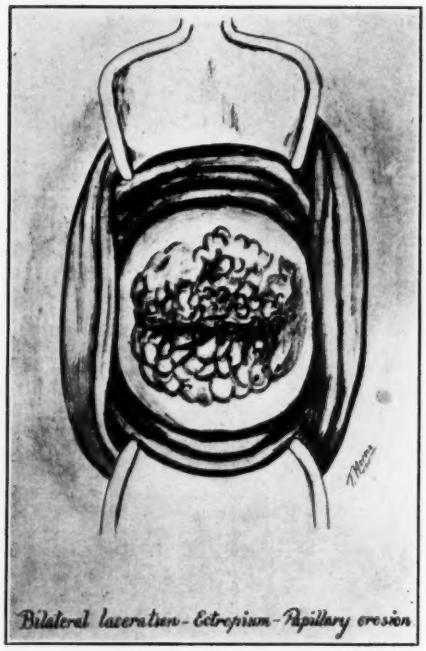

Fig. 6
Clinical appearance of papillary erosion.

external os that is covered with a thick, mucoid material. Blood vessels shine through and bleed freely when touched. This condition is spoken of as simple erosion. At this time the pathological process no longer remains within the endocervix. Hence, is not the term endocervicitis a misnomer after a simple erosion is demonstrable, and should its use not be more restricted?

On continuation of the inflammatory process there is also a continuation of the hypertrophy and hyperplasia of the columnar cells, this growth taking place in an exophytic manner. The increased number of cells must find a place of abode and the microscope shows them in tufts or papillae, on the portio, producing the well known papillary erosion, the second line of least resistance.

If the process continues and the stimulation is increased the new columnar cells do not further pile upon the portio, but show a growth spoken of as endophytic in type. During this stage the columnar cells are seen to multiply within the lumina of the racemose glands and the glands push out into the musculo-fibrous structure of the cervix, thus producing the well known follicular erosion, the third line of least resistance. At this time cell edema is quite marked, the ostia of the glands are closed and their lumina filled with mucus, the first step towards the formation of the follicles of Naboth, a pathological condition comparable to that seen in the formation of a sebaceous cyst. A similar cystic condition is seen during the healing process when the squamous epithelium grows over the ostium of the gland and the treatment has not been such as to arrest the continuation of the inflammatory process in the duct and in the lumina of the gland. A cervical polyp is an hypertrophy of the endocervical mucosa and seldom, if ever, becomes malignant. This completes the account of the histopathology of the erosions of the cervix. However, if the inflammatory process is not arrested at this time the andophytic growth of cells continues and the proliferation is so great that the cells are seen to pass from the canal to the portio, forming an adenoma. This condition is the last stage of the inflammatory process and is the

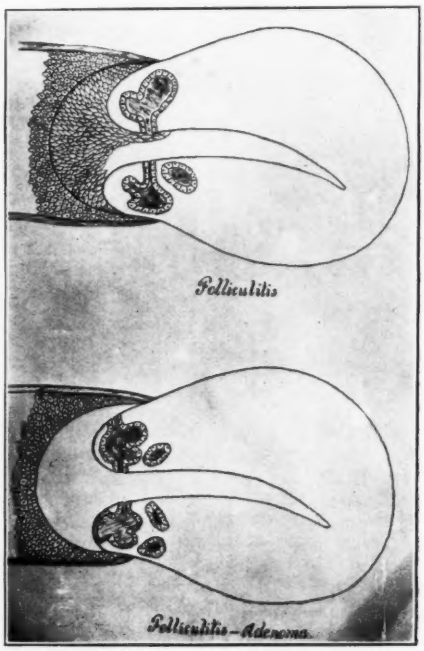

Fig. 7
The pathology involves the luminae of the glands in follicular erosions, more properly called "folliculitis."

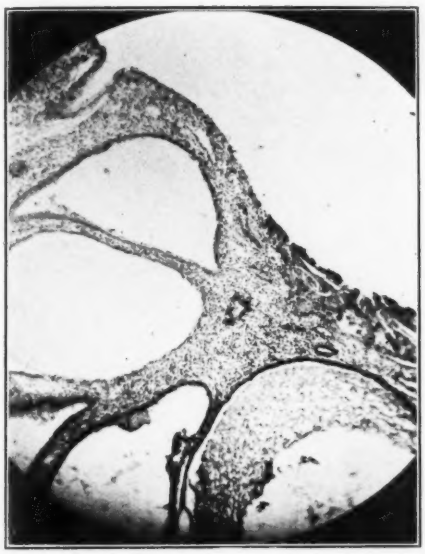

Fig. 8
Note the distention of the luminae of the glands with mucus, the beginning of the formation of a Nabothian cyst.

ideal background for the development of carcinoma. A break in the basement membrane with riotous cell growth is sufficient to produce a most serious situation, that of carcinoma of the cervix.

The treatment, therefore, in all cases of endocervicitis and cervicitis must depend upon the extent of the lesion, the nature of the infection and associated disease and must be varied according to the age and nubility of the patient. Pseudo-erosion, as has been suggested, is a congenital anomaly and requires no treatment. It is relatively benign and should heal and become covered by squamous epithelium at the time of puberty or soon thereafter, as the result of increased ovarian function.

Endocervicitis, the result of lacerations from childbirth, irritations from pessaries, attempts at abortions, intra-cervical cauterizations and strong chemical douches, in so long as the process is limited to the mucosa, may in most instances be eradicated by local applications and ordinary office treatment.

Acute cervicitis should be treated by bisecting the anterior and posterior lips of the cervix with the cautery knife.

Simple and papillary erosions should respond to cautery stripes, as will be shown in another slide. Follicular erosion, or folliculitis, requires a quartering of the cervix for its cure, the heat bringing about a cessation of the cellular proliferation within the lumina of the gland. Cyst formations are treated by stab punctures or stab incisions evacuating the content of the cyst.

Fig. 9
Adenoma and early carcinoma.

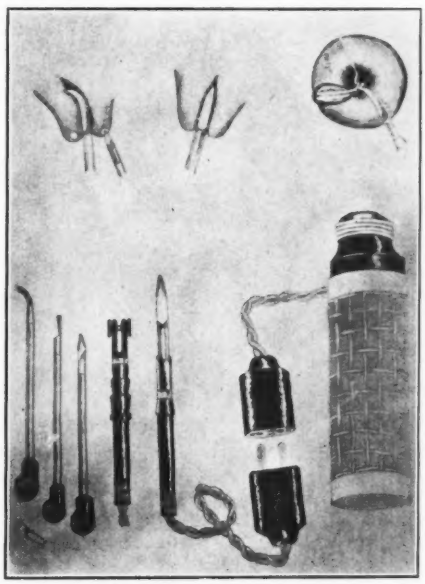

Fig. 10
A useful type of cantery for office work. The Baker model is better.

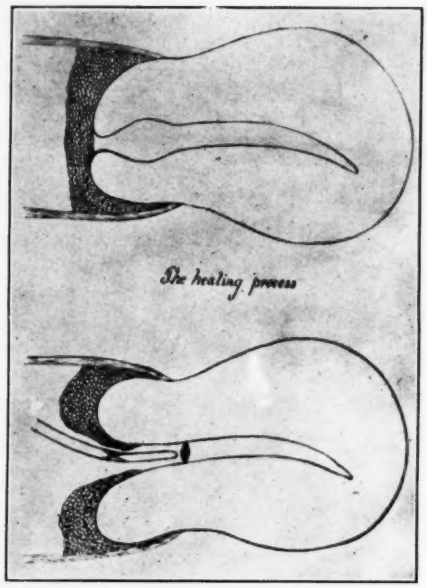

Fig. 11
The healing process must be carefully watched, usually over a period of eight to ten weeks.

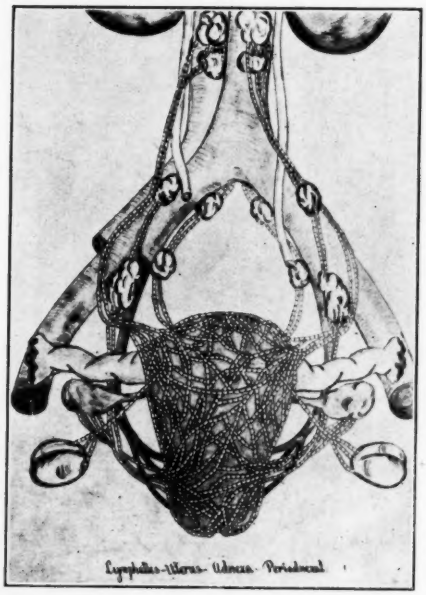

Fig. 12
Lymphangitis and lymphadenitis is responsible for many complaints of dysmenorrhea, menorrhagia, unilateral or bilateral lower abdominal pain, backache, etc.

Contrary to the custom of recurrence, unless the cyst wall is removed, as in sebaceous cysts, this form of cyst formation is curable by simple puncture. In this type of erosion there is a diversity of opinion regarding the treatment. Some of our leading writers claim that the cautery is not sufficient to establish a cure if the process has extended beyond the papillary type of erosion; however, others, of equal repute, claim that the cautery is sufficient for its cure. Diathermy is at present receiving much attention in this connection, and radium, though more expensive, is advocated by the select few.

After the adenomatous stage has been reached, in my opinion, all cases should be treated surgically, if for no other reason than to remove the tissue for biopsy and establish the presence or absence of an early carcinomatous change.

In the surgical treatment of the adenomatous cervix I am using the Rottenberg modification of the Sturmdorf tracheloplasty, the chief advantage in the modification being that one has the privilege of inspecting the extent of the pathological changes before coning out the cervix as is done in the original operation.

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DISCUSSION (*Abstract*)

Dr. M. Y. Dabney, Birmingham, Ala.—The commonest complaint that reaches the gynecologist is of leucorrhea, and the commonest cause of leucorrhea is an ectropion or eversion of the cervical mucous membrane. The first thing to rule out in any pelvic examination is malignancy. It is our greatest problem. Simply swabbing with a cotton pledget will determine whether or not there is bleeding of the eversion. If there is no bleeding, the burden of proof is on the one who says he is dealing with a carcinoma of the cervix. Many cases do bleed when swabbed with cotton. Even then the average gynecologist can identify 90 per cent of the carcinomas in the gross because they have an entirely different appearance from benign eversions. But those cases which honestly give doubt should have a diagnostic biopsy.

We all agree that the cautery treatment is the method of choice for the majority of eversions. With me, operation upon the cervix for eversion is almost a thing of the past. The Post cautery and nasal tip (the point stressed by Dr. Dickinson, of New York) I think are great improvements over the older type of cautery which did much more superficial and deep burning than we really wished.

It is a very easy matter to cauterize these cases when the main site of the trouble is on the outside of the cervix, but in the endocervix it is not always so simple. In a case that has an ectropion, a very marked endocervicitis with profuse leucorrhea and an almost nulliparous looking os, if we use the cautery we are very apt to get a stenosis. If we do an amputation, however efficient it may be in removing the leucorrhea, we know from the splendid work of Dr. Veader Leonard that it is also conducive to sterility. If a trachelorrhaphy is done, it does not always cure the leucorrhea, which we are assuming is the presenting symptom. If a Sturmdorf apple-core operation is performed, that is only slightly less conducive to sterility. Personally, I dislike to do a Sturmdorf. It is a pretty little trick, but with me any cutting operation upon the cervix has become a rare procedure. I cannot convince myself that in many cases it is superior to the cautery.

I wish Dr. Gann would say something about the treatment of endocervicitis associated with much leucorrhea but with a small os and little or no eversion.

Dr. L. McK. Rozier, West Palm Beach, Fla.—I am glad to hear Dr. Gann stress the lower abdominal symptoms of cervicitis. I have also noticed relief of these at times following treatment of the cervical condition. In the treatment of cervicitis we do very little operative work. My experience has probably not been so good in lacerations as Dr. Gann's.

Dr. Guy L. Hunner, Baltimore, Md.—As to the question of which of these cases are operable and which amenable to the use of the cautery, it seems to me that if a patient has in addition to a badly lacerated and greatly hypertrophied cervix, a relaxed vaginal outlet that needs repair, and possibly a retro-position of the internal organs that needs correction, and she has to take an anesthetic for these conditions, the only sensible thing to do is not to worry her with three or four cautery treatments. Sometimes five or six treatments at monthly intervals are necessary before you can control the cervical condition. Do a simple Sturmdorf or other cervical operation. Personally, I still stick to the old-fashioned amputation in spite of what Dr. Gann says about relegating that to the past. I think I can control the extent of my operation better by the old type of cervical amputation than I can by any of the newer types. But you must do it properly. You cannot simply amputate straight down across the cervix, but you must make the amputation after freeing the cervix from the surrounding vaginal mucosa. You must make the V-shaped incision into each lip of the cervix, then you can bring the vaginal mucosa to the uterine or cervical mucosa without danger of tension and cutting out of the stitches and exposure of raw areas to form vast scars surrounding the cervix. That is bad surgery, simply a bad method of doing what ought to be a satisfactory operation.

Acute cervicitis, I think, should be given serious consideration, that is, the early gonorrheal cases. If I find this condition I do not use the cautery for four to six months. And in the meantime I treat the gonorrhea before using the cautery or any operative procedure on the cervix.

As to the question of the type of cautery blade to use, I rather disagree with Dr. Dabney on the advantages of the tiny cautery blade. I like, as Dr. Gann says, a good, heavy cautery blade. You do not need to use a deep cauterization in all cases. On the more superficial conditions you make a very light touch with your cautery blade. But if you have deep retention cysts well up into the cervix you want something that will hold its heat until you get all the way up and let it sink well down into the tissues. Do not make your radial strokes too close together, but leave plenty of room for normal stroma when healing takes place. Otherwise you are liable, of course, to get an atresia.

Not only do you get definite backaches that are cured by clearing up the cervical condition, but one of the most interesting cases I ever had was one with gastro-intestinal crises. Now, that is going a long way up in the abdomen for trouble attributable to a cervical condition. In one lip of the cervix I found a crater almost one inch across. The patient had just been through a gastric crisis followed by discharge of something from the vagina, and it was quite evident that she had a ruptured Nabothian follicle cyst. Treatment of the cervical condition cured her gastro-intestinal symptoms and, incidentally, she had been married four or five years without children and promptly became pregnant following this treatment of the cervix.

Dr. Joseph Cohen, New Orleans, La.—I would like to suggest to Dr. Hunner that his case may have been allergic. Dr. B. G. Efron, of New Orleans, has described many cases of gastro-intestinal disturbance associated with cervical discharges. When the cervical condition is cleared up the gastro-intestinal trouble disappears. He explains it in terms of allergy.

Dr. M. C. Wilson, Miami, Fla.—I once did a cervical cauterization such as Dr. Gann pictured with the Post cautery, and the woman subsequently developed a spreading non-suppurative peritonitis. She recovered and was later operated upon, but no adhesions whatever were found. Whether the peritonitis was purely incidental or the result of cauterization, I do not know.

It is possible that trauma started it. Since then I have used a little wider cautery point.

A Member.—I would like to ask Dr. Gann to explain the method of anesthesia that he uses for cauterizations if he does them in his office. In many of our cases the anesthetic has been unsatisfactory.

Dr. Gann (closing).—All inflammatory lesions of the cervix have a primary basic pathology and should be treated according to the condition existing at the time and not according to a type of cautery, operation or anything else. Acute lesions of the cervix are usually gonococcal in origin. They may be primary in the urethra and secondary in the cervix or they may be primary in the cervix, depending upon the stage of the disease in the male at the time of transmission. An acute cervicitis may heal spontaneously or be treated by cautery or topical applications. I usually bisect the anterior and posterior lips of the cervix with a light cautery blade and treat the canal during the healing process with topical applications of 10 to 20 per cent argyrol. In acute conditions we are in reality dealing with an endocervicitis rather than a cervicitis, since the disease is limited to the endocervix. After chronicity is well developed the lesion will manifest itself in one of several ways, as I have outlined. A simple or papillary eversion may be treated with a light nasal cautery tip, but a folliculitis or so-called follicular erosion will require a deeper penetration. The adenoma is always surgical, if for no other reason, to eliminate the possibility of an existing malignancy by biopsy.

The treatment of cervicitis in all stages except that of adenoma may be accomplished in the office without anesthesia and without pain of any appreciable extent.

SIMPLE EXOSTOSES WITH DEMONSTRATION OF CASES BY X-RAYS*

By DONALD T. BABCOCK, M.D.,
Miami, Fla.

Exostoses are overgrowths of bone arising from the cortex, having the same structure as the bone, and generally ending in a more or less blunt point. They are limited by sharp straight borders. There are two kinds: the table top type, similar to a broad angled triangle, the base being attached to the cortex; and the long pencil type, arising from the cortex at an angle and pointing away from the nearest epiphysis. Occasionally the end is capped by a small oateoma. They are benign in character and occur most frequently in the first and second age periods.

In presenting these cases, only simple exostoses will be considered; no attempt at a general review of the subject will be made. The three cases reported were seen on the orthopedic service of the Jackson Memorial Hospital, Miami, Florida. *Cases I* and *III* are rather unusual as to the site of the exostosis. *Case II* is of the usual type and more common location.

Case I.—J. B., a man, aged 50 years, entered the hospital complaining of pain around the left shoulder girdle for the preceding six months and of increasing inability to use the right arm and forearm. The family history and past history were unimportant. There was no history of accident or injury. The patient stated that at times he had a sensation of numbness in the forearm and hand, which during the previous week had gradually increased until he was able to do practically nothing with the right arm.

Clinical examination revealed no masses in the region of the shoulder joint, and externally, apparently he was normal. He could not abduct the arm to more than 90 degrees. An x-ray was made which showed two bony masses as illustrated.

The tumors were approached by incision over the outer end of the clavicle and the masses were dissected out and removed by chiseling from the under surface of the clavicle. The inner mass extended down to and rested upon the brachial plexus and subclavian artery, and was very difficult to remove on account of these relations. The wound was closed without drainage and sterile dressings were applied. The arm was immobilized at the side for two weeks, at which time the sutures were removed and the wound was healed. Observations at weekly intervals showed gradual disappearance of the pressure symptoms and return to normal motion. Sensation returned in the right arm and forearm in about two months. The patient is apparently normal at the present time.

Case 1

Showing two bony exostoses on under surface of clavicle. Outer spur was about two inches in length.

*Clinic, General Clinical Session, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

Case 2
Simple exostosis on lower lateral aspect of femur.

Case 3
Unusual location of exostosis. This one caused no symptoms.

Case II.—J. A., a boy fifteen years of age, entered the hospital complaining of pain and limitation of motion of the lower third of the left thigh. He stated that six months before, while riding a bicycle, he fell off and injured the left thigh in its lower third, very close to the knee joint. He was confined to bed for two or three days, but was up and about with no apparent ill effect until one month later, when he noted return of pain in the same location, and slight swelling, which increased gradually until locomotion became extremely painful and limited.

Clinical examination revealed a hard bony mass on the outer side of the lower three inches of the left femur, which was not movable. X-rays showed the presence of a large bony mass on the outer side of the femur, the base having its attachment just above the lateral condyle, extending upwards about two inches.

Operation consisted of excision of the exostosis and dissection of the mass of scar tissue which surrounded it. The skin was closed without drainage and the sutures were removed in two weeks. Healing of the wound was prompt and walking was allowed in three weeks. There was a complete return to normal function in one month. Six months later no recurrence of the bony mass was observed.

Case III.—J. W., a negro man, aged 30, entered the hospital following an automobile accident, with a fracture of the lateral portion of the occipital bone on the left side.

The patient had previously complained of no pain nor pressure over the occipital region. No evidence of a bony mass was noted on clinical examination. X-ray was made of the skull at the time of the fracture, revealing a triangular beginning spur, attached to the inferior tuberosity of the occipital bone.

This case is of interest only as regards the location of the spur, which had given no symptoms and does not give any at the present time. The patient recovered from the skull fracture and refused operation for the spur. He is apparently healthy at the present time.

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THE TREATMENT OF CHARCOT JOINTS*

By E. David Weinberg, M.D.,
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The first accurate description of the changes in joints occurring in certain diseases of the central nervous system was given to us by Charcot.[1] As these joint affections occur mainly in tabes dorsalis and in syringomyelia, they were thought to be peculiar to these diseases. With the advent of the x-ray, changes similar to those found in the classical Charcot arthropathy have been found in other conditions.

The late War, in addition, produced many examples of marked bony changes following peripheral nerve injuries. Duncan[2] describes a classical arthropathy of the wrist joint following a trauma to several posterior cervical and thoracic roots. Phillips and Rosenheck[3] describe a typical arthropathy of the shoulder, in which no distinct changes, central or peripheral, were present. They conclude that the arthropathy resulted from prolonged muscle strain with its subtle influence on the trophic mechanism of the

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

peripheral neural apparatus. Shands[4] cites the case of a typical Charcot ankle following an injury to the posterior tibial nerve.

The incidence of Charcot joints in a study of 744 cases of tabes by Poole[5] was as follows:

	Total Number Cases of Tabes	Total Number Cases With Charcot Joints	Per Cent Incidence of Charcot Joints Among Tabetics
Whites			
Male	545	38	6.9
Female	130	3	2.3
Negroes			
Male	55	5	5.0
Female	14	.....	.....

A classical arthropathy is marked by a rapid hydro-arthrosis with a rapid involvement of the surrounding soft parts in a firm massive swelling, setting in usually without pain or redness, and often without external trauma. The swelling is then followed by a rapid disintegration of the joint, involving destruction of bone and cartilage, relaxation of ligaments and distention of the capsule, with a resultant abnormal position of the constituent bones.

Tapping of these joints usually gives a clear yellow fluid. In some cases it is redder and darker; and, in others, there has been a large admixture of blood. In the later stages, there may be little or no increase in fluid; again, there may be considerable quantities of fluid or more oily synovia.

Incisions disclose slightly reddened synovia, and synovial fringes may be present. In further advanced cases, the synovia is thickened, with an increase in its folds and fringes, such as is evident in arthritis of the hypertrophic type. In still more advanced stages, the fringes may be very long and may contain bone, or cartilage, in their ends. These may break free, and, with pieces of fractured bone, form the so-called "joint mice" or loose bodies.

Tears in the synovial sac have been demonstrated, through which the synovial fluid escapes. Cases have been reported in which the synovial fluid has been found in the submuscular tissues, some distance away from the joint.

The capsule and ligaments also suffer. Early changes are simply those of stretching and thinning; and, if properly treated, recovery may be almost complete. In the more serious cases, the ligaments and capsules are much thinner than normal, and are fused with the surrounding soft parts, tendons, muscles, and even with the subcutaneous tissues, so that they constitute an indistinguishable fibrous mass. In this tissue, islands of bone and cartilage are at times deposited. These may grow into massive shell-like plates.

The extent and frequency with which the cartilage is affected, in the early stages, is hard to determine. It may not be affected at all. In some cases a dulling or velvety appearance has been noted. In the later stages, changes similar to those found in hypertrophic arthritis are found; in fact, some authorities are of the opinion that, anatomically, these joints belong to the latter type.

Microscopic sections shown me by Moritz[6] while I was working in Erdheim's laboratory in Vienna, seemed to bear out this opinion. Moritz concludes that the earliest change in a tabetic arthropathy is apparently a degeneration of the joint cartilage, not unlike that seen in arthritis deformans. Whether this is a precocious degeneration, or a specific degeneration, he is not prepared to say. At any rate, he thinks the cartilage is rendered incompetent to withstand wear and tear. The proliferative changes he interprets as being simple in nature and as representing an over-response to injury; and considers the marked destruction sometimes observed as purely traumatic.

I believe that the acute disintegration of the joint is often a transitory phenomenon; and, at this period, the joint should be put at absolute rest. Repeated aspirations of the joint, especially in the knee, are indicated when there is a large increase in the amount of fluid.

The swelling about the joint may disappear rapidly and, often, has almost disappeared in several weeks. After this stage, a period of splinting is essential, as the swelling, particularly in joints unprotected, is prone to recur, followed by rapid loosening of the ligaments, with resulting subluxation and dislocation.

Henderson,[7] in an extensive pathological study, found evidences of marked shrinkage in the capsule in lesions of long standing, where the joints had been protected by crutches or by rest in bed. As a result, the joints were not nearly so flail.

If evidences of tabes dorsalis or of syphilis of the central nervous system are also present, the problem is one that requires the combined efforts of the syphilologist and the orthopedist.

Moore tells me that the Swift-Ellis treatment

is indicated in these conditions as intravenous therapy is not efficacious.

Poole's comparison of the spinal fluid findings in tabetics with and without Charcot joints is very interesting.

Cerebrospinal Wassermann	Tabes dorsalis with Charcot joints 37 cases	Tabes dorsalis without Charcot joints 316 cases
Completely positive	25 per cent	64.8 per cent
Moderately positive	35 per cent	15.4 per cent
Negative	40 per cent	19.8 per cent

The operative treatment has led to much discussion. To quote Jones and Lovett,[8] "In flail knees and ankles, excision may be preferable; for union, although sometimes slow, usually occurs." Keller[9] considers them bad surgical risks and believes that the majority of operative attempts are failures. Taylor[10] finds that operative procedures usually result in failures of union. Ridlon[11] states that tabetic joints must not be operated upon, as the patient is positively harmed thereby. Cotton[12] says:

"Many operative procedures that I know of in these cases antedate proper anti-syphilitic treatment, and it is not unlikely that many cases may, by proper treatment, be brought within the safe operative field for ankylosing operations."

We believe that there is a definite indication for operative intervention in selected cases. Cases which under conservative treatment show a progressive disintegration, often will be checked. We believe this is due to the fact that the stress and strain are removed from that part of the joint which is usually the site of the degenerative changes. Following this, there has been noted considerable new bone formation along the shaft of the bone, close to the joint. This added greatly to the stability and strength of the joint.

CASE REPORTS

Case I.—F. D. D., a white male, aged 52, was first seen by Dr. G. E. Bennett in July, 1924.

Several days previously his right hip gave away, while he was arising from a sitting position. He was unable to stand. The leg was very painful. He had been treated for syphilis in 1910.

Physical examination of the hip at this time showed the following: the right thigh was very much swollen below the groin, being 7 cm. larger than the other leg. There was an apparent shortening of 1.5 cm. Bryant's line on the right measured approximately 2.5 cm.; on the left 4 cm. The leg was rotated outward about 15 degrees. It could be brought to an upright position. Beyond this motion was painful. Considerable fluid was present. The pupils were irregular and did not react to light. The knee and ankle reflexes were not present. The blood Wassermann was negative.

A diagnosis of syphilis of the central nervous system and Charcot hip, right, was made. Resection was done August 7, 1924. The capsule was found to be three times thicker than normal. The head of the femur was lying loose in the joint, and pieces of bone were lying free. The neck of the femur just proximal to the greater trochanter was smooth, as though it had been sheared. The greater trochanter was chiselled off and attached down 1 inch. The neck was placed in the acetabulum. A plaster cast was applied with the leg in abduction and internal rotation. Convalescence was uneventful. He left the hospital on the sixty-first day. The patient went along very nicely for three years, when he developed a Charcot joint in the other hip.

Case II.—B. H. H., age 47, patient of Dr. W. S. Baer, in 1911 had lapses of memory and a feeling of extreme weakness. The Wassermann reaction was positive. He was given vigorous anti-syphilitic treatment. In 1921 he began to have pain in the right leg and back.

X-ray at this time showed some destruction between the fourth and fifth lumbar vertebrae. The bones were hard and dense. There was, also, some slight subluxation. A plaster cast was applied and worn for several months, after which he was given a brace. The pain in his back was relieved for a time, but gradually re-

Case I, Fig. 1 Before operation.

Case I, Fig. 2 Shortly after operation.

Case I, Fig. 3 Two months after operation.

Case I, Fig. 4 Three years after operation.

Case II, Fig. 1
Three years and six months after operation.

Case II, Fig. 2
Five years and nine months after operation.

turned. A kyphosis and scoliosis appeared. He was operated upon February 23, 1923. An Albee bone graft was inserted in the spinous processes, extending from the second lumbar vertebra to the sacrum. His back was considerably improved following the operation.

An x-ray taken September 19, 1923, showed an old Charcot joint of the fifth lumbar vertebra, with a bone graft present, showing good ankylosis. A hypertrophic arthritis also existed.

It is now about six years since he was operated upon. He is a gentleman farmer, leads a very active life, and is an enthusiastic hunter.

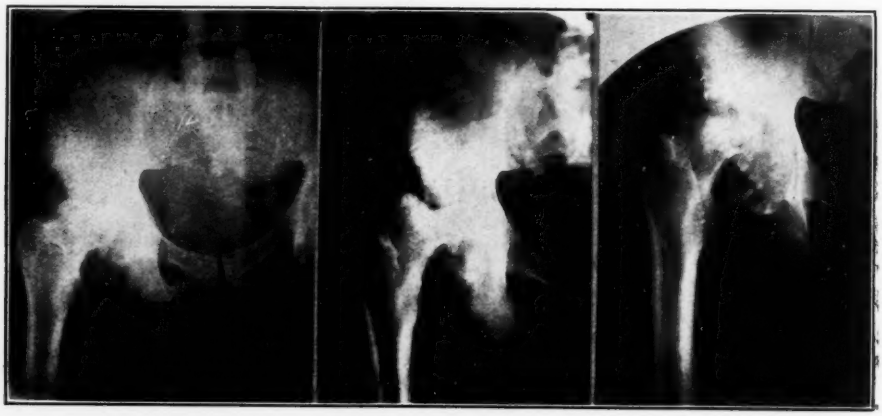
Case III.—D. R., age 63, was a patient of Dr. W. S. Baer. The diagnosis was syphilis of the central nervous system. A Charcot joint was found in the eleventh thoracic vertebrae. He had cystitis, pyelitis, and neurological bladder.

A note regarding his back at this time reads: As the patient lies flat on his stomach, there is a rather curious rounded dorsal kyphosis with an increase in the lumbar lordosis. The spine drops down suddenly from the twelfth dorsal, being very abrupt in character. The eleventh dorsal is prominent. The kyphos does not stick up sharply in contradistinction to the vertebrae, above and below, but appears to be sharp. The inference is made that the trouble is localized to one vertebra. There is no area of anesthesia around the rectum nor on the flanks. He was operated upon October 11, 1926.

Case III, Fig. 1
Two months after operation.

An Albee bone graft was placed in the spinous processes of the eighth dorsal to the second lumbar vertebrae. His convalescence was somewhat stormy, due to his kidney infection. He was kept in plaster casts for three months.

He was last seen one year ago. He is getting about very well. The pain in his back has been relieved by the operation.



Case IV, Fig. 1
Nine months previous to operation.

Case IV, Fig. 2
Just previous to operation.

Case IV, Fig. 3
Three months after operation.

Case IV.—A colored man, age 54, was first seen in the out-patient department of Johns Hopkins Hospital in January, 1929. He complained of pain in his left hip and knee of one month's duration.

The diagnosis was central nervous system taboparesis and left Charcot hip. He was started on vigorous anti-syphilitic treatment and a Thomas hip walking brace was made for him.

He had no relief from his pain, and x-rays taken at intervals showed a progressive destruction of his hip joint.

A resection was done August 22, 1929.

The capsule was much thicker than normal. The head and a portion of the neck was found lying free in the acetabular cavity. This was removed as was also some debris. The remaining portion of the neck was smoothed and reshaped and placed in the acetabulum. A piece of bone was also brought down from the ilium, to form a shelf over the upper rim of the acetabular cavity.

His post-operative course was very satisfactory. He was in plaster for three months. The plaster cast was removed two weeks ago. His hip is stable and painless, and even at this early period he has much more power in his limb than he had previous to operation.

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DISCUSSION (*Abstract*)

Dr. George E. Bennett, Baltimore, Md.—In the early days, all operative treatment for this condition was abandoned. Then, as time went on, as Dr. Weinberg has mentioned, Dr. Baer ran across this one very unusual type of a Charcot spine, in which the pain was in the large elements, which could not be controlled by conservative treatments. Because the spine in its processes and the lameness did not seem to be involved with the ordinary changes, he attempted to stabilize the spine with a graft, which was successful.

Dr. Weinberg showed you our reason for operating upon the first case. Up to that time I could recall no Charcot joint with much involvement outside of the capsule of the joint. I wondered if the tissues with the synovial fluid were the part involved. If so, we had a perfect right to assume that we could do away with this material, and have no further progression.

When the stress and strain play a part in the disintegration of a Charcot joint, as soon as the weight is transferred down to the shaft, as you saw in the x-ray, you had rather marked uniting of the Charcot joint itself. In other words, it formed a large enough mass to catch well under the muscle, and gave the patient a very much better hip than the one before operation.

At about the same time, Dr. Hagey, of New York, did a similar operation. He had not the same idea as to his reasons for it.

We do not feel that every Charcot hip should be operated upon.

The second case occurred in a man who had been under observation for some time. Even though it was a Charcot hip it was painful. We were rather anxious to carry on a little experimenting. We did not do the chip mar. We found that the very small portion of the head was fitting solidly and that if we conserved that and took off the remaining projects of the upper portion it would, perhaps, act as a stabilizer. It is early to tell how that is going to work out.

In cases which can not be controlled by proper bracing, after a conservative treatment of shrinkage fails, I think it is worth while to try a stabilizing operation.

I have never seen an involvement of spinal process of lamina Charcot spine, and it is very seldom that you get about hip joints an involvement outside of the capsule, because the stress and strain are not there. As soon as you transfer the stress and strain to some other part, the disintegration is there.

Dr. Frank P. Strickler, Louisville, Ky.—When we describe an operation such as the Whitman reconstruction operation on the hip, the essayist should give Dr. Whitman credit for it. We are all orthopedic surgeons and are thoroughly familiar with Dr. Whitman's technic.

Personally, I am not in favor of the Albee graft in spines. I have seen them fracture with immediate return of all the acute symptoms. I have x-ray pictures of cases treated by Dr. Albee that will prove this statement, and should be very glad to show them to any one interested in the subject. Personally, I have more confidence in the Hibbs spine fusion than in the Albee graft. I think you get, by the Hibbs technic, a much more lasting and stable fixation than with the graft.

I advise using osteoperiosteal grafts, if you care to, or, massive grafts placed on either side of the spinous process in combination with the Hibbs technic.

Dr. Kleinberg, of New York City, has, I believe, also employed plain beef bone to re-inforce the Hibbs operation, with much success.

EMBOLISM AND THROMBOSIS OF THE ABDOMINAL AORTA: REPORT OF A CASE*

By J. F. HAMILTON, M.D.,
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There are scattered throughout the medical literature of the past thirty years some 110 cases of embolism and thrombosis of the abdominal orta occurring together or singly.

Drs. Banowitch and Ira[1] reviewed the literature and reported an additional five cases in 1928.

In 1899, Welch[2] collected 59 cases, 45 cases being due to embolism and 14 to thrombosis. The sources of the emboli were believed to have been the heart in 35 cases; aneurysm of the ascending aorta in one; pressure of tumor on aorta in two; atheroma of thoracic aorta in one, and six were undetermined. The heart was normal in all eleven cases; there was mitral stenosis in twenty; acute mitral endocarditis in three; mitral endocarditis not further defined in four; mitral insufficiency without stenosis in one; thrombosis in the left auricle without valvular disease in eight; and, large aortic vegetations in one. Thus it is revealed that fully one-third of the cases were associated with mitral stenosis. Three cases were associated with the abdominal plugging, emboli, and thrombi in the vessels of the upper extremity. Hemorrhagic infarct of the intestines was noted in one case.

Hesse[3] in 1921, collected 73 cases, 41 of which had been mentioned by Welch. The majority of his cases were due to endocarditis; principally, mitral stenosis.

In 1922, Wylde[4] reported two cases and collected 92 others.

Since 1922, Banowitch and Ira collected eleven more cases besides the five cases reported by them. The majority of their cases were associated with chronic heart and arterial disease, over 50 per cent being definitely mitral stenosis with auricular fibrillation. The last five cases reported occurred in females, the youngest being seventeen years old, while the other four varied from 40 to 58 years of age. All were fibrillating and had signs of cardiac failure; four with auricular fibrillation were associated with a mitral stenosis and one with hypertensive cardiovascular disease. All were fatal, living from a few days to 44 days before developing Rider's thrombus; three of the cases showed the clinical picture of embolism to other vessels: in the vessels of the upper extremity in three cases; a cerebral, pulmonary and pelvic embolus in one case each. In one case at necropsy, mesenteric embolism was found.

Plugging of the aorta has occurred more rarely after acute infection, as rheumatic fever, puerperal fever, erysipelas, typhoid fever, pneumonia, influenza, umbilical infection in childhood, aneurysm of the aorta, arteriosclerosis and syphilis.

Because of the relative infrequency and marked pathology found at autopsy I report the following case:

CASE REPORT

H. D. A., a white male, aged 46, a business man, was hospitalized March 14, 1925, complaining of shortness of breath, "weak spells" and swelling of the feet and ankles.

The family history showed no hereditary predisposition to disease. The wife and several children were all well and healthy. The wife had had no miscarriages.

The patient had had measles and mumps in childhood, dysentery in 1918, while in service, which troubled him intermittently for six or seven years. He had malaria in 1899, and again in 1901. He had influenza in 1922, and again in 1923. The second attack seemed to affect his stomach particularly. He denied venereal disease and was never troubled with constipation. In 1918, he experienced sharp pains in his right side and leg. His doctor told him he had renal colic. In 1921, he began to notice what he described as a "general weakening, let down, tired feeling," from which he has never been entirely free. He thought financial depression which he had at this time aggravated his physical condition.

One year before his hospitalization shortness of breath began which since December had grown worse. In the preceding three months he had had frequent "weak spells." On March 10 he noticed for the first time that his feet and ankles were swollen.

Physical Examination.—For the sake of brevity only the positive physical findings will be given. On admission he was found to be a well developed and fairly well nourished white male. The skin of the face and neck was cyanotic, and he was noticed to take long deep breaths. Carious and abscessed teeth, gingivitis, embedded tonsils with red faucial pillors, signs of chronic passive congestion of the lungs, liver and kidneys, dyspnea, edema of the feet and ankles, enlarged heart and inconstant arrhythmia, blood pressure 172-106-66, normal temperature, and pulse rate 104 in each radial, were found on physical examination. The patient stated that he had gained 15 pounds in the previous two weeks.

Laboratory Examination.—There were 4,800,000 red blood cells, 80 per cent hemoglobin (Dare), 9,000 white cells, 70 per cent polymorphonuclears, 4 per cent mononuclears, and 1 per cent basophils. The blood Wassermann was negative. The urine contained a trace of albumin, occasional hyaline cast, and white cells. Its specific gravity was 1.025 and phenolsulphonephthalein excretion was 22 per cent in two hours.

X-ray of the chest showed peribronchial thickening and irregular striations radiating in all directions from the hila, apparently reaching the periphery. A 7-foot heart plate revealed marked enlargement. The aortic arch was 4.3 cm., left 19 cm., right 6 cm., left side 11.8 cm.

Rest, diet, and digitalis were ordered for this patient, under which he improved steadily.

The general improvement was marked. After complete disappearance of the dyspnea and edema and a loss of 22 pounds in weight, he was allowed to leave the hospital on March 27, thirteen days after his admission.

Clinical impressions at this time were:

(1) That he had chronic fibrous myocarditis with broken compensation, and

(2) Chronic cardiac hypertrophy.

For about eleven weeks this patient attended to the discharge of his duties, but he experienced respiratory embarrassment at times. On the afternoon of June 16, he spent several hours in the hot sun and drank much iced water. About 5 o'clock in the afternoon he rode a street car down town, and walked up one flight of stairs to the office of a masseur. The masseur noticed that the pa-

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tient was almost prostrated and gave him a very light treatment. The patient then went to a nearby poorly ventilated lavatory where he fell in a faint. He was removed to a physician's office where remedial measures were instituted which revived him somewhat. He had no pulse when he reached the physician's office and he was thought to be dying. Marked emesis, purgation and priapism developed and he complained greatly of abdominal pain. As soon as he was revived sufficiently he was sent home. Later in the night he was removed to the hospital in a state of prostration. He was orthopneic; the skin of the face, neck and upper part of the thorax was cyanotic. Cheyne-Stokes respiration was noted. Sibilant and sonorous rales were present throughout the lungs. The pulse rate was 125 per minute. The apex impulse was diffuse and heaving. No distinct murmur was heard, but a short, soft roughened sound was detected with the first sound at the apex. The pulmonic second sound was accentuated. The blood pressure was 166/133/28 and pulsus alternans quality was noted. Other physical findings were the same as when he left the hospital eleven weeks previously.

Laboratory Findings.—He had 5,210,000 red blood cells, 90 per cent hemoglobin, 17,000 white cells, 91 per cent polymorphonuclears, 7 per cent lymphocytes, 1 per cent eosinophils. Specific gravity of the urine was 1.036; albumin was 4 plus; white cells 1 plus; red cells 3 plus. On June 20, the 24 hour total urine output was 650 c. c. On June 25, it was 1,150 c. c.

Another 7-foot heart plate gave virtually the same measurements as recorded above.

Treatment was symptomatic and supportive. His dyspnea improved, but rest was obtained only following the use of an opiate.

While he was in the hospital his temperature ranged between 94.6 and 99.6°; his pulse went from 112 to 150; his systolic blood pressure was 130 to 166, and diastolic 110 to 138. He grew weaker and weaker when suddenly at 11 o'clock a. m. June 25, he began to complain of numbness of the right leg and foot, followed in minutes by the same sensation in the left leg and foot. This was followed shortly by violent pain in the lower extremities. Large doses of morphine gave some relief. About 2 o'clock p. m. the same day, edema of the lungs, marked dyspnea and unconsciousness suddenly developed. Each respiration appeared to be the last one, until 3:45 p. m. when, just as suddenly as the attack began, he began to expel by explosive expiratory effort large quantities of frothy material. This froth was so great in amount that it welled out of his mouth. This continued for an hour, at which time breathing became somewhat easier. Restlessness continued. Periods of consciousness were registered up to near the end. Complete rigor mortis of the lower extremities was present at 6:00 p. m., June 25, seven hours after the beginning of the agonal state and 14 hours and 30 minutes before death, which occurred at 8:30 a. m., June 26.

AUTOPSY

External Examination.—The body was that of a well developed and fairly well nourished adult white male. The skin of the face and the upper third of the thorax was cyanotic. Below the waist line the skin was cold, and bluish to purplish-blue discolorations were prominent, with rigor mortis complete.

The eyes revealed a slight scleral injection. Only a few teeth remained and they were dirty and surrounded by diseased gums. The thorax was barrel shaped and the musculature was massive. The abdomen protruded, especially below the umbilicus. No initial sclerosis was present, but mild hypospadius on which a meatomy had been performed was present. The right testicle was large and blue in color. A lipomatous mass was found on the right nates and a bloody fluid oozed from the anal opening.

Brain.—The meninges were congested. The parenchyma had a lowered consistence and also revealed an extensive left cortico-occipital hemorrhage, quite old.

Lungs.—Both were dark in color and heavier than normal. Both upper lobes contained old adhesions, the left apex being involved, and calcified nodules were felt in the upper left. The parenchyma on the cut surface revealed an increased consistence and free oozing of dark red blood in all lobes. No infarcts nor arterial occlusions were seen.

Heart.—The pericardium was thickened. The pericardial fluid was not increased in amount. An area of acute fibrinous pericarditis the size of a quarter was situated on the anterior surface of the left ventricle. The heart was almost twice the normal size. The cut surface revealed a gray to brown muscle containing many white lines visible to the eye. The ventricular walls were greatly thickened, especially the left. The right ventricle was contracted, while the left was dilated and contained a large blood coagulum. There was apparently no dilation of the mitral and tricuspid orifices. The mitral cusps were thickened and the papillary muscles in the left ventricle were enormously hypertrophied. No thrombi were found. A yellowish deposit beneath the endocardium was noted in the left ventricle adjacent to the aortic orifice.

Coronary arteries revealed thickened walls and yellowish atheromatous areas.

Aorta.—The thoracic portion of the aorta was increased in size. It presented sacculated dilatations as well. The most marked deformity occurred at the junction of the transverse and descending portions. To touch, the entire aorta felt stiff, brittle, crepitant and completely inelastic. Internally, one noted marked atheromatous changes. This surface was very uneven. It had a worm-eaten appearance and a tendency to peel like the "bark on a pine tree." Here and there were creamy white, opaque elevated patches covered by a thin translucent membrane. The pipe stem openings of its branches were made more prominent by being elevated and surrounded by a yellowish deposit. Many longitudinal folds were present. Here and there were seen surface erosions, 2 to 15 mm. in diameter, involving the intima and media. Their edges and bases were rough and ragged. Many of these were covered by thrombi. The proximal 7 cm. of the left common ileac artery was completely occluded by a firm thrombus. Likewise the right was occluded by a shorter well formed thrombus which began 4 cm. from its origin. A blood clot and thrombus (also called a Rider's thrombus) filled the lumen of the aorta for a distance of 5 cm. above the bifurcation. The right renal artery at its opening was plugged hard and fast by a thrombus. The left renal, celiac, superior and inferior mesenteric arteries revealed patent openings.

The liver was one-fifth to one-fourth smaller than normal. Its consistence was increased and grayish brown in color. The cut surface revealed a thickened capsule and an increase of fibrous connective issue throughout. This surface was moist and firm.

The pancreas appeared to be normal.

Fig. 1

Photo of internal aspect of abdominal aorta. Note large thrombi completely occluded common iliac arteries; also many smaller thrombi covering atheromatous erosions of intima. Observe a match sticking into opening of left renal artery. The opening of right renal artery is completely occluded by thrombus.

The spleen was slightly enlarged, dark red in color and in consistence about normal. A considerable amount of bloody fluid escaped onto the cut surface.

The left kidney was half the normal size and greatly distorted. The capsule stripped with difficulty. A large scar near the lower pole, by contraction, presumably, had produced a deep notch, the depth being half the thickness of the kidney. The cut surface was gray and about one-third of the parenchyma had been replaced by scar tissue, the latter involving the medulla.

The right kidney was about normal in size, dark red and had a rubbery consistence. The capsule stripped easily except where it was involved by what appeared to be an old scar. The cut surface was bloody and dark red.

Gastro-Intestinal Tract.—The stomach was dilated with gas. It was normal in color. The duodenum and the first 5 feet of the jejunum were normal. The rest of the jejunum, all of the ileum, the cecum and the proximal half of the ascending colon were greatly distended by gas and were dark red. The peritoneal cavity contained a moderate amount of sanguino-serous fluid. Blood vessels in the great omentum were engorged.

MICROSCOPIC EXAMINATION

Brain.—The left occipital lobe contained a diffuse hemorrhage. The parenchyma had been pushed aside. Considerable hemosiderin pigment was present. The leucocytes had phagocytized some of the pigment.

Lungs.—Many so-called "heart failure" cells were seen in these organs. Chronic passive congestion was marked and the capillary loops bulged into the air sacs.

Heart.—Fibrosis was marked. Much of the muscle had been replaced by dense fibrous connective tissue. The remaining muscle fibres were hypertrophic. Scattered through the tissue were seen quite a few lymphocytes and polymorphonuclear cells. Endothelial leucocytes were fewer in number. No perivascular cell collections were seen.

Aorta.—In the intima and media were many areas variable in size free of any evidence of living tissue. These were most numerous in the deeper portion of the intima. They were described as being purplish-pink, amorphous and granular, containing clear split-like areas. One whirlpool-like process was observed which had extended apparently from the intima into the media. Splintered-end elastic tissue fibres were seen at each side of this area and others deeper in were seen semicircling the deepest part of it. A few lymphocytes were noted in the intima beneath the roughened, irregular endothelial lining. Small perivascular collections of lymphocytes and endothelial cells were seen in the media.

Liver.—Considerable periportal cirrhosis was present and in it were many lymphocytes. The cell cords were narrow and widely separated. Chronic passive congestion was marked. Hemosiderin pigment was present. The absence of liver cells around the central vein was conspicuous.

Fig. 2

Photomicrograph of section of aorta. Note whirlpool-like excavating effect of the pathologic process involving intima and a portion of media. Note irregular broken ends of elastic tissue fibers and some semicirculing the base of the process. (Weigert's elastic tissue stain, .450x.)

Pancreas.—This organ showed an increase of fibrous connective tissue.

Spleen.—Only remnants of the splenic corpuscles were seen. Many of the small arteries revealed hyalinization. Chronic passive congestion was marked. Considerable pigment was noted.

Kidneys.—In the right kidney the lumina of the convoluted tubles were dilated, the epithelial cells were coarsely granular and some were broken up. The glomeruli were swollen to their limit. Free blood was seen in Bowman's capsular spaces. An occasional degenerating glomerulus was seen. Hyaline change and thickening were very evident in the small arteries. Some of the straight tubules were filled with blood. Slight evidence of fibrosis was noted. A few masses of scar tissue were seen.

COMMENT

The case here reported affords several points of interest some of which are: (1) the etiology of the marked pathologic change in the aorta; (2) the absence of the pathological cardiac condition commonly found in the 110 previously reported cases; (3) the extremely high mortality rate; (4) probable long duration (seven years) of aortic disease with possible embolic showers.

Upon physical examination marked gingivitis, carious and abscessed teeth were found. These teeth were extracted one or two at a sitting. The roots were colored green. This focus of infection must be considered as playing a prominent part in causation of the cardiovascular disease. In fact, it becomes the more important when one recalls the negative history, negative blood findings and negative tissue reaction to that age old enemy of the aorta, *Treponema pallidum*. There was no evidence anywhere in the body of lues. There was slight bulging of the aortic wall in places but no definite aneurysm even with the marked pathologic change that was present.

The absence of valvular disease in this case offers strong contrast to the heart lesions found in many of the previously reported cases. On the contrary the disease lay in the heart itself and in the arterial tree.

The mortality rate is practically 100 per cent. Only two cases have been saved from an almost immediate and tragic death.

The history of pain in the right side and leg of 1918, a physician's diagnosis of kidney colic, with very old evidence of possible kidney embolism anatomically, offers strong argument that the aortic disease was present seven years before his death. This, of course, is presumptive.

As stated in the autopsy report, there was no valvular disease in the heart, but the disease in the heart was that incident to foci of infection and arterial disease. In the 110 cases reported in the literature, atheromatous change as a cause of the plugging of the vessels was mentioned only once.

If chronic cardiac valvular disease could be established as a diagnosis in a patient who had already developed or was in process of developing embolism or thrombosis of the abdominal aorta, there would be greater chance of prolonging the patient's life by applying one or both of the two methods of treatment that have been used than in the case (here reported as an example) where there was no valvular disease. It is very evident that the aortotomy with removal of the thrombus would prove futile in a case where the aorta was diseased as in this case.

The age of the lesion in the brain indicated that it occurred nine days before death, and also that it was responsible for symptoms present at that time.

CONCLUSIONS

(1) A case of embolism and thrombosis of the abdominal aorta and a number of its branches is reported.

(2) The primary focus of disease in this case is believed to be oral sepsis and other factors claimed to operate in producing arteriosclerosis.

(3) The case presented none of the findings in the heart common in previously reported cases.

(4) Aortotomy with removal of Rider's thrombus in this particular type of case, I think, would prove futile so far as prolonging the life of the patient.

Note: I wish to express my appreciation to Dr. C. D. Allen and other associates for their cooperation in reporting this case.

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A CASE HAVING THUMBS WITH THREE PHALANGES SIMULATING FINGERS*

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This case is reported because of the rarity of the anomaly. After a thorough search of the literature we were unable to find a report of a similar case in the American literature. However, three cases have been reported in French and Danish literature.

The nearest approaches to our case in American literature were reported by Windle,[1] Reeves[2] and Weingrow,[3] but they were all supernumerary distal phalanges.

Kirmission,[4] Arquembourg[5] and Kristjansen[6] reported cases similar to ours in which both the right and left thumbs had three phalanges. Grynkraut[7] reports a case which had three phalanges in only one month. Bienvenue[8] reports a case of supplementary thumb with three phalanges.

This case was brought to my attention by the employer of the negro, who was working in the laboratory on some pipes as a helper. The employer asked me whether I had ever seen a negro with five fingers on both hands instead of four fingers and a thumb. On inspecting them, I saw what you see in *Fig. 1*. I then questioned him about his family history and learned that his mother was living and well, and that she had one abnormal thumb similar to his; his father was living and well; one sister, who was living and well, had one abnormal thumb like his; one sister who was dead had no abnormality; and two brothers were living and well with no abnormality. His grandmother, who was dead, had abnormal thumbs which were similar to his. The patient was married, but had no children.

Roentgenograms of the other members of the family could not be obtained, as they were living somewhere down in Georgia.

A roentgenogram of both hands is seen in *Fig. 2* and we notice that the second phalanx in the right thumb is about twice the length of the second phalanx in the left. As a result of this there is much more motion in the right thumb than in the left.

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Much discussion has taken place as to whether the thumb possesses three phalanges and no metacarpal, or one metacarpal and two phalanges. I shall not attempt to discuss this, but will merely quote from Cunningham's "Anatomy" in regard to this point.

"The metacarpal bones are developed from primary and secondary centers; but there is a remarkable difference between the mode of growth of the first and the remaining four metacarpals, for whilst the shaft and head of the first metacarpal are developed from the primary ossific center, and its base from a secondary epiphysis, in the case of the second, third, fourth and fifth metacarpals the shafts and bases are developed from the primary centers, the heads in these instances being derived from the secondary epiphyses. In this respect, therefore, as will be seen hereafter, the metacarpal bone of the thumb resembles the phalanges in the manner of its growth, a circumstance which has given rise to considerable discussion as to whether the thumb is to be regarded as possessing three

Fig. 1

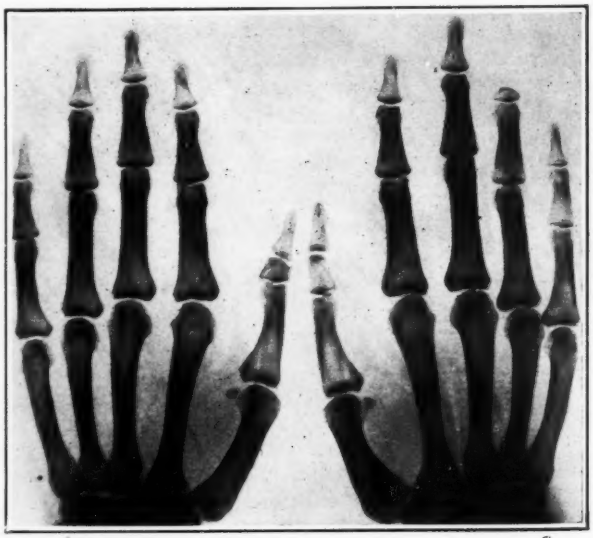

Fig. 2

phalanges and no metacarpal, or one metacarpal and two phalanges."

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FRACTURE OF THE SOLEUS MUSCLE: REPORT OF ONE CASE*

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The following case is added to the literature because of its unusual etiology and to emphasize the value of roentgenography in the diagnosis of certain muscle injuries.

CASE REPORT

W. G. P., a well developed white male, age forty-seven, was admitted to the Fracture Service of Rush's Infirmary, Meridian, Mississippi, October 1, 1929, because of an injury received a few minutes previously while he was working beneath an automobile. The car, from which the wheels had been removed, was elevated by four wood blocks. The patient was under the car lying on his side with his legs extending beneath the running board when the blocks slipped suddenly out from under one side of the car, allowing the whole weight to fall upon the left leg. The pain was most excruciating and a hypodermic of ¼ grain of morphine did not give relief. A depression 1 inch square, exhibiting a pinkish discoloration, was present in the posterior surface of the leg at the junction of the middle and lower thirds. Palpation of this area caused slight pain. Very slight passive motion of the ankle caused severe pain in the lower part of the calf. Radiograph made by the soft tissue technic showed an oblique tear through the soleus muscle in its lower portion. The tendo Achillis was intact and no evidence of bone injury was revealed.

Because of the severe trauma a plaster cast was applied to the foot and leg. When it was removed ten days later the u-shaped discoloration described by Thomas was clearly demonstrable. Physiotherapy was begun and active motion encouraged, but pain was so severe that sleep was interfered with at night. Two days later a second and bivalve cast was applied. Daily baking, massage, passive motion, and muscle stimulation by the surging sine wave were instituted.

Three weeks after injury, the second cast was removed, an elastic support was applied and the patient was encouraged to walk an increasing amount each day with the aid of a cane.

At six weeks, examination showed the muscle to be firm. There was no limitation of motion. There was a slight limp in walking and constant pain in the calf muscles was complained of. The cane and elastic support were both discarded.

At nine weeks, there was no noticeable limp. Some pain was still complained of. The patient was discharged.

DISCUSSION

Because of the great popularity of lawn tennis in England during the Nineteenth Century, and of the frequency with which rupture of some portion of the calf musculature or tendinous structure occurred, the name "lawn tennis leg" was given to the condition. In 1884, Wharton P. Hood[5] advocated early mobilization as the therapeusis par excellence for the condition, which treatment has remained in vogue until this day.

The literature which has accumulated on this subject has been largely recapitulation. For

Fig. 1
X-ray immediately after injury showing tear of soleus.

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that reason we shall record here only the salient points of the condition.

Frequency and Clinical Picture.—In over 500 cases of muscle and tendon tears reviewed by Grassheimm[4] in 1921, tears in calf muscles were second in order of frequency, spinal muscles and fascia being first. Rupture of calf muscles occurs usually from a sudden, violent, almost involuntary contraction of the muscles, as in an awkward landing in jumping. The patient is seized with a sudden, severe, knife-like pain in the calf; as Hood described it, he has "the characteristic feeling of having been smartly struck upon the calf." Walking is often excruciatingly painful and the patient may have to be carried from the scene of the accident.

Diagnosis.—The physical signs are variable and are dependent upon the structures involved. The diagnosis is most frequently made from the history. Ecchymosis is often present. In tear of the gastrocnemius muscle or Achilles tendon a distinct sulcus may be felt. This sign was present in a case which came under our observation.

The value of Roentgen photographs is stressed by Thomas[9] and by Kuttner.[7] According to Thomas the differential diagnosis of injuries of this type is facilitated by a careful observation of the bruises which are present a few days after the accident, there being certain markings characteristic of certain specific lesions. He points out that (1) in ankle sprains the bruises are most intense along the lower borders of the two malleoli, and later become general around the ankle; (2) in Pott's fracture it is most intense in the neighborhood of the internal malleolus; (3) in rupture of the plantaris muscle near its insertion it becomes most intense between the internal malleolus and the os calcis, whilst later on it is evident on the outer aspect of the tendo Achillis; (4) in ruptured fibers of the soleus muscle in its lower part there is usually seen bilateral discoloration on each side of the tendo Achillis, and their upper limits become connected by a broad band of mixed colors giving an u-shape to the bruise; (5) when the tendo Achillis tears there is bilateral discoloration on each side of the tendon running downwards below both malleoli and joined at the level of the malleoli or the seat of the ruptured tendon by a transverse band, thus giving the bruise its characteristic H shape.

Treatment.—Treatment aims at the earliest possible restoration of function. In mild cases walking should be begun at once with the aid of a cane. Elevating the leg a few minutes and then strapping the leg firmly with adhesive plaster, or applying a snug fitting elastic support may assist materially. In more severe cases rest in bed with baking and massage may be necessary for a few days, but walking should be encouraged at the earliest possible moment. Violent exercises should be avoided for from four to six weeks. The prognosis is good. Recovery is usually complete in six weeks, though some pain may persist for several months.

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CONTUSED WOUNDS OF THE ABDOMEN*

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Being unprotected anteriorly and laterally by bones as the other cavities of the body are, the abdominal viscera are more susceptible to injuries from contusions than are those protected organs of the cranium, the thorax and the pelvis; and in abdominal injuries the best knowledge and reasoning of the surgeon are taxed to determine what organs are involved and to what extent they are injured. Contused wounds of the abdomen are the result of direct violence, either by some blunt missile which is hurled against the abdominal wall, or by the body's being hurled against something so that the abdomen receives the impact of some blunt object.

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Pathology.—The impact of the object against the abdomen may be so slight as to cause only a slight injury to the external abdominal wall, or it may be so great as to injure and even rupture any of the abdominal organs. It may be so great as to injure the great solar plexus of nerves to the extent of producing immediate death through shock to the nervous system without any visible external injury. Any of the abdominal viscera may be injured by contusion and the internal injury be entirely without any external visible signs of injury; but there are certain parts which are weaker and more susceptible to injury. Of the alimentary tract, a rupture may occur at any point from the stomach to the rectum; but ruptures of the intestines are more common at the folds of the bowel, as at the pyloric orifice, or at the junction of the ileum with the cecum. The duodenum may be injured by direct violence driving it against the spinal column, in which case there may result a post-peritoneal abscess from extrusion of the contents of the gut into the post-peritoneal tissues. Rupture of the liver or spleen may result in death from hemorrhage if the patient survives the shock. There may be rupture of the kidney, or the kidney may be torn from its attachment, resulting in a floating kidney. The pancreas may be driven against the spine, resulting in injury to that organ. The omentum may be torn, causing violent hemorrhage. If the bladder is full at the time of the contusion, it is liable to rupture. In the female, an abdominal contusion over the gravid uterus is almost certain to result in abortion. In fact, no abdominal tissue is exempt from injury when there is severe contusion of that region.

Symptoms.—If the missile be blunt and smooth and the impact be great, the internal injury may be severe, even fatal, without any mark or sign on the superficial tissues. In all severe cases the internal injuries are out of proportion to the external, or superficial injuries. On account of the nerve supply of the abdominal organs through the great solar plexus of sympathetic nerves, the most prominent symptom in all cases of internal injury is shock. The shock may be most violent when the physical injuries to the tissues are only minor. In such cases, if the shock is not fatal in itself, the patient may be normal again in a few hours, or in a few days at most. Accompanying the shock, vomiting is a very prominent symptom, and it may be severe and persistent. In all cases of contusions of the abdomen involving the viscera, there is some degree of peritonitis. If there is no rupture of the viscera, the peritonitis is of the serious type without infection; and, while it carries with it the usual symptoms of tenderness, swelling and effusion, it is most often benign and clears up in a short time. If, however, there is rupture of some viscus with extrusion of blood and the contents of the viscus, the symptoms will grow worse with progressive rise of temperature. The shock, too, will persist longer, and the constitutional symptoms will be more marked as time goes by. If there is a breach in the alimentary tract, the gas and other contents of the intestines will escape into the peritoneal cavity, the tympanites will be marked at first and will grow worse as time goes by, while the infection from the extruded material from the gut will increase the inflammation of the peritoneum, and the fermentation from the yeast germs will increase the gas till the abdomen will have the appearance of a tightly distended balloon. If the hemorrhage is considerable, the abdomen will be filled with blood, and there will be symptoms of loss of blood, while the percussion note over the abdomen will be that of a dull thud.

Diagnosis.—Diagnosis is certainly the fundamental step in all practice of medicine and surgery; and this is doubly true with the railway surgeon who has not only to treat the injured, but has to decide, in many cases, the extent to which the symptoms are due to the immediate injury. Then, too, the surgeon is sometimes hampered by the diverse and misleading statements of his patient, who is planning to extort an unreasonable sum from the railroad company. Remembering this, the surgeon must be ever on the alert to see that the statements of the patient coincide with the physical condition as presented before his eyes, lest he permit such statements to sway him into mistakes in diagnosis as presented in his preliminary report, and to bring him to humiliation at some later day when he is called to testify in court. There are two good reasons why we should delay active operative procedure in cases of abdominal contusions: the one is to give the patient time to recover from the shock, and the other is to give ourselves time to approach a more definite diagnosis. If the injury to the internal viscera is not severe, the shock will soon clear up and the means of diagnosis will be much easier. If there is no rupture of the viscera, the tympanites will follow the course of the intestines; but, if there is rupture of some part of the alimentary tract, the tympanites will be evenly distributed over

the abdomen. The minor injury will grow progressively better, while the rupture will grow worse, and the percussion note in the latter will be clear, indicating a gas distention. If there is rupture of large blood vessels, causing hemorrhage, the blood will gravitate to the lower portions of the abdominal cavity, and over this area, the percussion note will be dull as over a solid mass, while the note over the intestines where they are buoyed up to the apex of the distention will be the clear note of the gas collection. However, the mistake must not be made of thinking that the blood will remain fluid, for when the blood clots, it will not gravitate from its position as the body is turned, which makes an easy means of differentiating between a collection of blood and a collection of some other fluid. If there is injury to the stomach, the vomited material may contain blood. In case of injury to any part of the alimentary tract, there may be blood in the feces; and the nearer the injury is to the anus, the brighter will be the color of the blood. If the injury is high up in the intestinal tract the blood may be so much digested and contaminated with the contents of the bowels that it may not be recognized. A contused injury to some part of the gut may cause occlusion of the gut, and this would be followed by vomiting of any of the contents of the bowels above the point of injury, while the obstruction would stop the movements of the bowels. An injury to the kidneys or bladder may be indicated by blood in the urine and the position of the injury may be determined by the use of the ureteral catheter.

Differentiating injuries from diseases of the abdominal organs would be easy in most cases if the surgeon could have the cooperation of his patient; but, in many cases, the surgeon must depend almost entirely on the physical condition as he finds it, and as little as he can on the statements of his patient. The one great point of differentiation is shock. Let us keep in mind always that injury to the abdominal viscera produces shock in all cases, and the degree of injury is almost always in proportion to the persistence of the shock. The symptoms of old inflammations and abscesses are not so acute as those of injury. In operative cases the condition of the tissues should clear up the diagnosis; but the non-operative cases may sometimes be a little perplexing. Even when the patient is inclined to practice deceit, his first statements may give a wonderful amount of information before he has time to adjust his thoughts for his claim; and that is the time to elicit the information as to former diseases. One of the most annoying conditions which confronts the surgeon is that of the chronic hypochondriac. This condition is usually easily diagnosed by getting a careful history of the patient's life at the time of the injury. The history combined with the absence of shock and other acute symptoms should clear up the diagnosis. Internal hemorrhage is the one condition which requires hasty diagnosis. In other cases, a little time spent in making a diagnosis is always worth while.

Prognosis.—When the patient survives the primary shock, the prognosis varies with the class and extent of the injury to the viscera and the strength and resistance of the individual. Where there is no rupture nor severe contusion of the viscera, the prognosis is very favorable; and a few days of rest is usually sufficient to let the organs undergo repairs by Nature's process. An uninfected peritonitis soon adjusts itself; and the serous effusion is usually absorbed in a short time. Rupture of any of the abdominal viscera is a grave condition, and with the best of care it sometimes proves fatal. One favorable point in abdominal contusions is that these injuries are of the soft tissues; and, if death does not supervene as a direct result of the injury, recovery should be perfect and complete with no after worries except, perhaps, a few adhesions. Let it stand ever before us that the degree and persistence of shock is the index to the prognosis.

Treatment.—The primary, or first-aid treatment, should always be directed to the relief of shock and hemorrhage. As has been indicated above, no operative treatment, except that to control hemorrhage, should be undertaken before the patient has revived from the shock. When shock is under control, and the diagnosis is sufficiently well made to determine the condition, further treatment may be undertaken. Where there are no symptoms of injury to the viscera of a serious nature, and the symptoms do not indicate internal hemorrhage, only palliative treatment with rest in bed may be necessary; but, if there are definite symptoms pointing to rupture of the viscera, nothing short of operative procedure with repair of the breach will give relief. In all of these cases, each operation must be done to meet the special condition of that case. Each case is a law unto itself and must be treated according to the demands of the case.

CASE REPORTS

Case I.—Only a few weeks ago a young man was brought into my office suffering from shock. He had been riding on the side of an automobile when a passing car struck him in the side of the abdomen, causing most violent shock for a short time. A careful examination did not disclose any serious injuries; and there were no symptoms of loss of blood. He had been unconscious, but the shock was already passing off. I gave him a stimulant and an opiate and ordered him to bed. The next week he was able to attend school without any inconvenience. This illustrates the benign case in which the primary shock was severe but passed off rapidly, indicating the benign nature of the injury. It shows, too, the rational idea of waiting.

Case II.—About two years ago I was called to a woman who had been injured by the collision of her automobile with a railway engine. The worst of the shock had already passed off although I was only a few minutes reaching her. She was suffering from several minor injuries, among which was a contusion of the lower left abdomen. She did not develop any symptoms of peritonitis. Neither did she develop any symptoms of injury to the internal organs. In a week she was able to come to my office for treatment. All of her organs functioned as well as before the injury. Several months after the injury, she developed an abscess about the right fallopian tube for which she underwent an operation. Only recently a suit for damages from the railroad company was decided against her, in which suit, she alleged that the abscess in the right side was brought about by the collision with the railway engine. As a material witness, I applied the points of diagnosis as outlined in this paper. That this was a benign injury which did not involve the internal organs was clearly shown by the mild shock, by the absence of any degree of peritonitis, by the fact that all of the internal organs continued to function normally and by the fact that all of the symptoms of injury passed off in a short time. If this injury had been the cause of the abscess, there should have been more symptoms of internal injury; the shock should have been more severe and should have persisted longer; there should have been symptoms of peritonitis with some tenderness in the region where the abscess developed. There should have been some interference with function; and the injury should have had something to do with the introduction of the infection causing the abscess. This is another benign case in which the primary shock was a fair index to the condition; and it illustrates, too, the necessity for the surgeon to depend on the physical symptoms before him for his diagnosis.

Case III.—A few years ago I was called to a family, several of whom were injured in the wreck of an automobile truck. One child was in a state of intense shock, but had little external evidence of injury. I advised immediate removal to the hospital; but the family preferred to wait. The next morning the shock had not passed off and the child had not passed any urine since the accident. Catheterizing showed the bladder empty. We carried the child to the hospital and operated at once. The bladder was ruptured and the urine extruded into the abdominal cavity. The child never rallied from the shock and died a few hours after the operation. This illustrates the grave condition when there is rupture of the viscera, and it shows, too, how this grave condition was indicated by the persistence of shock.

Case IV.—Many years ago, when that almost extinct animal, the horse, was more in use, I was called to an elderly gentleman whose horse had kicked him in the abdomen. There was no marked visible injury to the external abdominal wall; but the man was in a state of collapse from shock. He suffered from great tenderness over the abdomen; but there was little distention. The depressed state from shock persisted; and the bowels were dormant with symptoms of locked bowels. Upon opening the abdomen we found severe serous peritonitis with some injury to the intestines, but no rupture. The bowels seemed paralyzed from the blow over the solar plexus; and the old man finally died without ever fully recovering from the primary shock. This case illustrates well the grave condition resulting from a severe blow over the solar plexus; and it shows, too, how it was indicated by the persistence of shock.

Case V.—A case which illustrates the necessity for thoughtful diagnosis came to me under the head of a railway train accident. A lady was suffering from neurasthenia; and she had been in bed many months with no relief. The condition seemed to be purely hysterical, though I was never able to make the necessary examination to warrant me in making a definite diagnosis. This lady was returning from some Northern place to her Florida home; and she was in her berth, for she was not supposed to be able to be out of bed, when the accident occurred. After arriving at her Florida home, she seemed to discover that she was injured, and that she had a claim against the railroad company. I was requested by the railroad authorities to visit the lady and determine the extent of her injuries. Complying with that request, I made the visit and learned through the lady and her mother that they had been in a wreck of their train while on the way South, and that she was not aware of any injury to herself at the time of the wreck of the train; but she had discovered some time later that she had received severe injuries about the abdomen, and that these injuries were prolonging her bedridden condition indefinitely. She was seemingly so extremely tender about the abdomen that she could not bear the slightest touch of a finger without flinching and almost crying out. She would not permit me to make any kind of examination either with or without an anesthetic. I left her that day and agreed to return on a certain day about a week later, hoping to find her tenderness abated; but at the second attempt to examine her, the condition had not changed in the least. I tried to persuade her to go to one of the Atlantic Coast Line hospitals where she could get a complete examination and probable relief; but she refused to go anywhere or have any kind of examination.

This was certainly a case of imaginary or feigned injury. The woman's condition was just as it had been through many months before the wreck through which she had gone. There was no shock nor indication of injury at the time of the wreck. So far as I could learn, all of her organs were functioning normally except her brain, which was probably the center of all of her ills. She had been suffering many months from hypochondriasis, which condition had not been changed in the least by the wreck through which she had gone; and it had come to her mind to charge her bedridden condition to injuries received at the time of the wreck; but she was not aware of the necessary symptoms to feign a real injury. I informed her that my duty was to relieve the injured and that I had nothing to do

with claims against the railroad company. This case illustrates the extremities to which some extend their claims and shows, again, the necessity for the surgeon to keep ever in mind those symptoms which illustrate before his eyes the diagnosis of injuries.

Discussion follows paper of Dr. Rivers, page 545.

EARLY RECOGNITION OF ACUTE ABDOMINAL DISEASES*

By F. J. KIRBY, M.D., F.A.C.S.,
Baltimore, Md.

The early recognition of acute lesions in the abdomen is something which all have at times strongly desired, and looking back over our experience, we can recall many instances in which the diagnosis was missed, or delayed until the issue in the case was anything but successful.

The acute abdomen brooks of no delay, either in diagnosis or treatment, and time is valuable, since a few hours may change the condition of the patient from one of safety to impending dissolution.

The first and cardinal symptom is pain, and pain which has continued for six or eight hours is almost always a surgical entity.

Under no conditions should morphia or any opiate be administered for relief of pain until the diagnosis and decision as to surgical treatment have been made. Opium does not mitigate the disease, which progresses, but merely clouds the picture.

Before attempting to diagnose acute abdominal diseases, one should familiarize himself with the anatomy of the abdominal organs and their environs, the nerve and blood supply, as well as the muscular and skeletal structures surrounding. Likewise he should have a knowledge of the physiological activities of the body, especially as applied to the organs in the abdomen.

With this knowledge acquired, one should, upon seeing a case, begin with the history of the patient. The patient should give his age, occupation, and state in life, then (if he is able) relate the story of his illness in his own way. After this, questions can be put as to the onset of pain, duration, its character, location, and any change in its course. He should be questioned as to nausea or vomiting and the condition of the bowels and urine. If the patient is a woman the menstrual history should be obtained. It is wise to obtain some previous history as to former diseases and health.

After this a physical examination is given. This should include the mouth and rectal temperature, pulse rate, respirations, blood pressure, urine examination, white blood cell count with differential, and if possible, a blood Wassermann.

The cardinal symptom is pain, and sudden severe pain in the abdomen, associated with collapse or fainting, vomiting and sweating, always means the rupture of an abdominal viscus.

Appendicitis.—In appendicitis, the pain begins in the epigastric or umbilical region and travels downward to localize with tenderness in ten to fourteen hours in the right lower quadrant of the abdomen. The pain of appendicitis always precedes the nausea or vomiting.

Pain coming on suddenly late at night or early in the morning, with vomiting and nausea, and continuing unabated, means obstruction in the appendix, due to a stricture of fecolith, and the appendix is going on to gangrene and rupture. If the appendix is pointing downward to the pelvic cavity, a pelvic appendix, tenderness will be found along Poupart's ligament about midway between the anterior superior spine of the ileum and the pubes.

If the appendix is post-cecal, tenderness with rigidity of the quadratus lumborum muscle will be made out in the loin posterior. In these cases the abdomen is soft, frequently with no rigidity, and with little or no tenderness over McBurney's point.

In cases in which the appendix is post-cecal, red blood cells are often found in the urine.

Rigidity is in proportion to the irritation of the overlying peritoneum. Leucocytosis is in proportion to the tension. The greater tension the bacteria are under the higher the white cell count, the polymorphonuclears predominating.

All cases of appendicitis are well on the road to recovery, or else come to operation, within four or five days after the beginning of the attack.

In all acute abdominal lesions, one should not wait for nor depend upon rise in temperature.

The temperature in appendicitis does not begin to rise until from eighteen to twenty-four hours and more after the beginning of the attack, and it rises slowly.

*Read in Section on Railway Surgery (Southern States Association of Railway Surgeons), Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

Where there is pain in the abdomen with sudden high temperature, one must look for the trouble elsewhere; and it will probably be found in the thoracic cavity.

Perforating Ulcer of the Stomach, Gastric or Duodenal.—In this condition the pain is sudden, severe, agonizing.

A patient may be feeling well, and the next moment he is writhing and groaning in the most intense pain, crying out, begging for relief. With this he is shocked. His countenance is anxious, face pale, sweating, especially about the forehead, the pulse is small, quickened, and he vomits and retches. The pain is most intense in the epigastrium, but is rapidly generalized over the abdomen, with retraction and marked board-like rigidity of the abdominal muscles. The tenderness is everywhere over the abdomen, but is most intense in the region of the pylorus. The patient is frequently found lying on his left side, with his thighs and legs drawn up in marked flexion. He objects to being moved, as it increases his pain, and may complain of pain on top of one or both shoulders. The respirations are shallow and quickened. The temperature in the early stage is subnormal.

In a few hours this passes off, reaction takes place and the patient is easier, looks better, his pain lessens, his body becomes warmer, and his temperature rises to normal. The physician or surgeon may be deluded with the idea that the patient is improving. This is the dangerous period, and it is largely at this stage that the patient has a good chance for recovery by operation. The pathological inflammatory process goes on unabated, and peritonitis is extending.

The board-like rigidity of the abdominal walls, with tenderness extending into the pelvis, continues with fluid accumulating in the peritoneal cavity, and absence of liver dullness or diminution of it in the axillary line. The patient still opposes any attempt to move about, as it causes pain. This stage is followed in a short time with all the symptoms of a general or diffuse peritonitis, the recovery from which is very doubtful.

If operated upon in the first eight or ten hours, cases of perforating ulcer have good prospects for recovery.

The earlier the operation the safer for the patient, as the mortality rises rapidly aften ten or twelve hours. If the operation is delayed twenty-four hours, few patients recover.

Pancreatitis.—Acute pancreatitis is fortunately a rare disease, and seldom is the correct diagnosis made. The patient may have suffered from some gastro-intestinal disturbance, and colicky pains and nausea may have been experienced for some time previously. More often he is in the best of health, usually robust and inclined to stoutness. He is suddenly seized with violent pain in the epigastrium, with eructations, vomiting and tendency to collapse, sweating, weak pulse, and cold extremities.

Vomiting often is incessant, pain is diffused over the epigastrium radiating back to the loins, and up to left shoulder, with upper abdominal distension, tender and resistant area in the epigastrium, weak pulse, subnormal temperature, sometimes cyanosis, and restlessness, restlessness even after morphia has been administered for the severe pain. The tenderness is marked in the epigastrium and in a little while appears in the lower abdomen. In some cases jaundice is present due to obstruction of the common bile duct; occasionally there is glycosuria. There is a high leucocytosis.

If the patient's life is prolonged, peritonitis sets in, pain and tenderness become generalized over the abdomen, the abdominal muscles become rigid, followed by distention, rise in temperature, rapid thready pulse, intense thirst, delirium, and death.

Rupture of the Intestine.—This may happen after any injury to the abdominal cavity, as a fall, blow, or knock on the abdomen, or the sudden pressure of the elbow against the abdomen in wrestling. The symptoms are pain, local rigidity, tenderness, and frequently vomiting. The opening in the intestine may be very small or may be an almost complete severance of the tube.

When an intestine is injured, peristalsis ceases. If the tear be very small, the edges of the protruding mucous membrane may close the opening, or a bit of omentum may plug the hole in the intestine.

A certain amount of intestinal content escapes, setting up a local peritonitis, and symptoms quiet down. After a few hours the intestinal contractions start up again, the closed rupture in the intestine is opened, and peritonitis quickly develops in accordance with the extent of the rupture. Rupture of the intestine is a dangerous lesion and unless it is operated upon early, death will almost surely result from peritonitis.

Intestinal Obstruction.—The most common causes of acute intestinal obstruction are strangulated hernias, of the femoral and inguinal type. Other causes are intussusception, volvulus, for-

eign bodies, fibrous bands, peritonitis, and carcinoma.

The first symptom is pain, which comes on suddenly. The pain is severe, may be continuous, or may come on in spasms, as the peristaltic action of the gut tries to overcome the obstruction.

Vomiting almost always occurs. First, it is the contents of the stomach, then mucus, later greenish bile, then yellowish fluid, and finally it is feculent. Fecal vomiting occurs only when there is an opening between the colon and stomach.

The higher up the obstruction the more intense is the vomiting. There is constipation and inability to open the bowels. Neither feces nor flatus can pass.

Early, an apparent movement of the bowels may occur, as the result of peristalsis below the obstruction, but absolute constipation is the rule. If the obstruction is low down, distention develops in the intestine above the obstruction, and visible peristalsis is present, Von Wahl's loops. High obstruction causes little distention, but violent vomiting. The lower down the obstruction, the less the vomiting, and the greater the distention.

In a few hours the patient shows his illness by his anxious expression, pallor, sweating, cold extremities, sunken eyes, rapid heart, and feeble pulse, shock, marked dryness of the mouth, and constant thirst.

Unless relieved quickly he succumbs to peritonitis, dehydration, and exhaustion.

Intussusception.—This occurs in children as a rule up to two years of age, well nourished, and healthy. The onset is sudden. The child screams with pain, and draws up its legs during the attacks of pain.

The pain comes on in paroxysms. In the interval the child is quiet, but the face is pale, the countenance anxious, and the pupils are dilated. Vomiting usually occurs. In about twelve hours, bloody mucus, sometimes with a little fecal matter, is passed per rectum.

By this time a tumor can be felt in the right quadrant, or in the epigastric region, or in the left side, as the invaginated gut passes onward through the large bowel. The tumor is spoken of as sausage shaped, and sometimes the apex of the invaginated gut appears at the anus.

Unless the patient is operated upon early, the end result is intestinal obstruction, peritonitis, and death. The diagnosis is usually easy.

Gall-Bladder Disease.—Cholecystitis is an inflammation of the gall-bladder. with or without stones. The infection is bacterial, due to typhoid, colon, or some of the pyogenic group, and is usually a mixed one. The process varies from simple inflammation to gangrene.

In cholecystitis the pain is localized in the gall-bladder. Vomiting occurs, but is not so severe as when gallstones are present.

There is marked tenderness over the gall-bladder, and the distended gall-bladder can be felt. When the inflammation extends to the tissues about the gall-bladder, as the omentum, and peritoneum the tenderness is increased in area, and the abdominal walls of this region are rigid.

Jaundice does not occur unless the inflammation extends, causing pressure on the common duct. Fever is present, but does not rise very high unless the infection is virulent. There is an increase in the leucocytes.

Perforation or rupture of the gall-bladder is accompanied by all the symptoms of rupture of any abdominal viscus. However, there is a previous history of cholecystitis and colicky pains due to the distending gall-bladder. Diffuse peritonitis rapidly sets in due to the infectious material from the gall-bladder's being spread over the peritoneum.

Acute Empyema of the Gall-Bladder.—Pain comes on suddenly in the right upper quadrant of the abdomen, with nausea, vomiting, quickened and feeble pulse. Respiration is thoracic. There is a rise in temperature, a leucocytosis, tenderness over the abdomen, especially in the region of the gall-bladder, and as distension of the gall-bladder occurs it can be palpated.

Jaundice does not occur, as a rule, and empyema of the gall-bladder is usually associated with gallstones. Intestinal symptoms are sometimes associated with it, and may lead to a diagnosis of intestinal obstruction. The danger is of rupture and extension peritonitis.

Ruptured Tubal Pregnancy.—Usually there is a history of cessation of menstruation for one or two periods, then a flow slight in amount, which the patient may consider as a normal menstruation since it may appear at about that time. The rupture takes place between the sixth and twelfth week of pregnancy. In the majority of cases, rupture is preceded by cramp-like pains

in one or the other iliac, and in the hypogastric region.

The symptoms of rupture are sudden abdominal pain, vomiting, faintness, cold sweating, and collapse, with sudden anemia, and rapid weakened pulse. The abdomen is tender. There is marked tenderness on vaginal examination when pressure is made behind the cervix against Douglas' pouch. There is usually a discharge of a clot of blood or decidual membrane.

Symptoms of Hemorrhage.—The abdomen is soft but tender, there is apt to be some rigidity in the lower abdominal region.

The uterus by vaginal examination is felt to be soft and lifted upward and forward against the pubes, by the collection of blood in the posterior cul-de-sac, and a tumid mass can sometimes be felt on one side of the uterus. These cases call for early operation for control of hemorrhage.

Pyelitis.—Here is a condition frequently found in comparatively young pregnant women. It is most often diagnosed as appendicitis, especially when it occurs on the right side; and frequently appendectomy has been performed.

It occurs about the third or fourth month of pregnancy, and is most common on the right side. Pyelitis generally begins with a chill, or chilly sensations, high temperature, and pain in the loin (most often the right) with history of some previous vesical disturbance.

There is no rigidity of the abdomen. Tenderness is elicited over the affected kidney, in the loin, and frequently along the course of the ureter. The urine is cloudy, contains pus cells, and frequently blood cells.

Rupture of the Kidney.—There is a history of injury, a knock, or blow over the kidney, or a fall, striking against a resisting object.

The symptoms are pain, followed by profound shock. This passes off in an hour or so, the urine shows blood, there is tenderness over the injured kidney, swelling, and sometimes ecchymosis.

Further symptoms depend upon the extent of injury to the kidney, and urinary extravasation into the tissues.

Rupture of the Urinary Bladder.—This may result from an injury such as a fractured pelvis, or a blow over the bladder, above the pubes.

The bladder is empty of urine or may contain a very small amount, and this is bloody. The symptoms depend upon urinary extravasation. If rupture occurs into the peritoneal cavity, peritonitis results; if outside of the peritoneum, there is cellulitis in the perineum, over the pubes and at times into the scrotum.

This calls for operation, closure of rupture if possible, and free drainage.

Gastric Crisis of Locomotor Ataxia.—In the gastric crisis of locomotor ataxia, we have the girdle sensation, the Argyll-Robinson pupil, the Romberg reflex, and positive Wassermann reaction.

Referred Pain in Pneumonia.—Pneumonia usually starts with a chill, or chilly sensations, and high temperature. Appendicitis does not. In pneumonia we also have the flushed cheeks and expiratory grunt.

SUMMARY

Pain is the prominent symptom in acute lesions in the abdomen.

Sudden sharp pain, with retching and vomiting, associated with sweating and collapse, means rupture of an abdominal viscus.

Nausea or vomiting is almost always an associated symptom.

Rigidity is in proportion to the irritated peritoneum.

To rely on the pulse rate, or to wait for rise in temperature, is to lose valuable time.

Refrain from opiates.

The physician or surgeon should not be deceived by a lull in, or lessening of, the symptoms.

Early operation will save life, and a clean, carefully performed abdominal section can do no harm to a patient.

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DISCUSSION (*Abstract*)

Papers of Dr. Rivers and Dr. Kirby

Dr. John F. Wilson, Lakeland, Fla.—I do not feel that I can add anything to Dr. Rivers' paper, further than to stress the importance of a correct diagnosis of contused wounds of the abdomen. If the injury is more than superficial, our attention should be directed to the damage inflicted upon the underlying viscera. We

should note that there has been no injury to motor nerves or muscular continuity, for such an injury would probably be followed by some degree of deformity or protrusion.

Our best attention is then necessarily drawn to the underlying abdominal organs.

Dr. Southgate Leigh, Norfolk, Va.—Dr. Rivers' paper is comprehensive. The reported death rate in contusions of the abdomen has been high, apparently unreasonably so, due to a great extent to delay in operating.

The vital question is, of course, to determine promptly the extent of the injury and, where operation is indicated, to operate promptly if the patient's condition will permit. Every possible aid to diagnosis should be used.

Claybrook, in the *Virginia Medical Monthly*, stresses the following important signs and symptoms: (1) transmission of heart and respiratory sounds over the abdomen is important if present, though it may be absent; (2) "silent abdomen," that is absence of peristalsis; (3) deep local tenderness; and (4) marked rigidity.

Lyman, in the SOUTHERN MEDICAL JOURNAL, quotes Kricke, who feels that tension of the abdominal wall is the sole infallible sign of organic lesion requiring immediate intervention, with "costal breathing" (the abdomen remaining immobile), a sign of the next importance.

Passing over the cases of suspected internal hemorrhage, which are not difficult to diagnose, it is well to bear strictly in mind that a perforation of stomach or intestine may at first give scant symptoms, but must be operated upon early. As an example, we can all recall cases of penetrating bullet wounds, which frequently caused no early bad effects.

If shock is too profound for immediate operation, it must, of course, be delayed. When the general condition is good and perforation is suspected, operation should be done at once.

All cases should be watched with the greatest possible strictness, and practically with ceaseless vigil, the various indicated examinations and tests being made from time to time.

Dr. J. Shelton Horsley, Richmond, Va.—The term "acute abdomen" may not be good English, but every surgeon knows what it means. Each case should be decided on its own merits. There is a typical picture for perforation of the duodenum, consisting of intense pain, shock, rigidity and board-like abdomen, but I have had a patient with perforation of a large posterior ulcer in the duodenum with comparatively slight pain and almost no rigidity in the upper abdomen, but with symptoms indicating first a right kidney colic and later appendicitis. The contents from the duodenum gravitated around the kidney and toward the right iliac fossa. These unusual cases must also be borne in mind. Many other conditions, such as gastric crises, pleurisy and pneumonia, must be considered, but if these can be reasonably well eliminated by clinical examination and observation, and the patient is quite ill, it is better to operate as soon as possible than to delay to a time when the diagnosis may be more evident but the operation less successful.

Each of these cases must be decided upon its own merits. We must bear in mind what Dr. Kirby has said, that mortality in cases of perforation of duodenal ulcers increases rapidly after the first six to eight hours following the perforation. It is practically 100 per cent in twenty-four hours after the perforation.

Dr. J. W. Alsobrook, Plant City, Fla.—Dr. Rivers' paper stressed injuries to the abdomen, but he did not stress injuries to the mesentery, and injuries to the mesentery are quite as dangerous as perforations. If you operate and do not find the perforation and your patient dies, it is probably because of an unnoticed injury to the mesentery. The slightest injury to the mesentery can produce very grave results.

Dr. Kirby warned you against giving opiates until the diagnosis is made. In Baltimore, all of the doctors may have learned not to give laxatives and purgatives, but all the members of the Southern Medical Association have not, and certainly the families of the patients in the South do not hesitate to give castor oil or C. C. pills or anything else with pain in the abdomen. I think every member of this Association should stress that one point. It is more important than not giving an opiate. Never give a laxative or purgative with a pain in the belly.

Dr. W. L. Little, Wesson, Miss.—Dr. Kirby and the Doctor who preceded me say, never give a purgative or a dose of morphine before the case is diagnosed. I agree that a purgative should not be given. As a general practitioner I have found, however, that sometimes a small dose of either codein or morphine given judicially will assist us in making a diagnosis. We find a patient who has an extremely rigid abdomen, in great pain, or with shock. If he is given an opiate he soon presents a different picture. Then make the examination.

In selected, or extreme cases, an opiate will assist you in making a diagnosis, provided you make the examination immediately after giving the opiate or as soon as the patient begins to relax. I do not hesitate to give morphine and it has helped me in many difficult cases.

Dr. Mary Freeman, Perrine, Fla.—A few years ago I was called to see a negro who, while unloading 200 pound bags of fertilizer, had a severe pain in his abdomen. His moaning sounded like pneumonia, but upon examination his abdomen was found to be rigid and in knots. Believing it was an acute abdomen we rushed him to the hospital. While the operating room was being prepared, we went carefully over the chest, and found lobar pneumonia. He was treated for pneumonia and recovered.

Dr. E. T. Newell, Chattanooga, Tenn.—Three points should be brought out. One of them, the speaker who preceded me, mentioned. That is the danger of "operating for appendicitis" in obscure pneumonia cases.

Then, too, you may have a patient knocked down by an automobile, with board-like rigidity, which you think is due to some intra-abdominal injury, while the condition is very frequently due to fractured ribs.

I had a case very recently illustrating this point. The roentgenologist in his routine examination had reported the chest negative for fracture. I had the chest x-rayed again, but from an oblique angle, and found four fractured ribs. One should be careful how the x-rays are taken in cases where there is a possibility that frac-

tured ribs are giving the rigidity. Many of you have seen radiograms of the chest, one picture, taken straight down, anterior-posterior, where there was no indication of a fracture, but the oblique position will bring the fracture out very clearly.

Dr. Kirby is right that morphine should not be given too freely, but if a man is brought to you with an injury of the abdomen, suffering from shock, you do not want to withhold morphine or all opiates just to see what is going to develop in the abdomen.

There are certain cases in which morphine is very beneficial. So you have to give morphine in a certain definite number of cases even when it is impossible to make an early accurate diagnosis.

Dr. E. P. Lacey, Bessemer, Ala.—Four years ago tomorrow, I had a perforated duodenal ulcer. The shock and pain were so severe it seemed to me that I could not survive long, unless I were given something to relieve me. The symptoms were so marked and pronounced there was no doubt in my mind as to the cause of the trouble, and the surgeon agreed with me in my diagnosis.

The pain was the most intense I believe a human being could endure. Had it not been for morphine, I would have been in a very poor condition for an operation. It gave me such relief that I blessed the man who discovered it.

Morphine given indiscriminately and without examining the patient, I agree with the gentleman who preceded me, will masque symptoms, but it is not good practice to exclude it in all cases. It relieves apprehension, banishes fear of the operation, and induces a mental attitude that is conducive to the well being of the patient.

Dr. Rivers (closing).—It may appear that Dr. Kirby and I do not agree as to the time to operate; while Dr. Kirby insists on early operation, I insist on waiting till the patient has revived, not recovered, from the primary shock, which is not long delay.

As to the matter of opiates, I must say that I sometimes give them to relieve the intense pain and find that they help to relieve the shock; but I would advise that they be not given as routine.

Dr. Kirby (closing).—It is those very rare exceptions which prove the rule, for instance the case mentioned by Dr. Horsley.

In gunshot wounds, there is an initial pain usually spoken of by the patient as a stinging, burning pain, this as the result of the high velocity of the bullet.

If any of the abdominal viscera are perforated, peritonitis with rigidity of the abdominal walls early sets in.

There is no valid reason for giving opium to patients you suspect of having some acute abdominal lesion until the diagnosis is made and disposition of the patient as to surgical treatment has been decided upon.

The ice cap is often more potent in the relief of pain than is morphia. In intestinal obstruction it is far better to give these patients something to increase their discomfort so that they will agree to early operation than to dose them with opium, which merely soothes their pain, while the danger is increasing.

TRACHEOBRONCHIAL ADENOPATHY IN CHILDREN*

By G. H. Withers, M. D.,
Miami Beach, Fla.

Lymphoid tissue predominates in childhood; in some children it is even excessive. Its constant activity, judged by the ever presence of the germinal centers, shows an intimate association with the pathology, bacteriology and immunity of this age.[1] The lymph nodes have an elective capacity to absorb circulating bacteria and thus in their protective role are prone to swelling and hyperplasia. While in the robust child these swellings subside upon the cessation of the infectious processes in the neighboring tissues, there are others in whom there seems to exist a vulnerability of the lymph nodes, so that their hyperplasia is out of all proportion to the existing cause and continues after the cause ceases to operate.

Because of the prevalence of upper respiratory infections, and the dangers of repeated exposures to infectious and contagious diseases in early life, there exists a recurring pathological condition, not only of the cervical lymphatics, but of those draining the tracheobronchial pulmonary area, the bronchial nodes. These are located in the middle mediastinum, and in close proximity to the trachea, bronchi, blood vessels, and nerves found in this region. Pathological conditions of the bronchial nodes in infancy and childhood, whether calcareous, caseous, caseo-calcareous, or simply hyperplastic, should be seriously considered and diligently sought for in any of the following clinical groups presented for examination. If their existence is established it will not only aid in the diagnosis and explanation of many symptoms, but will point the way to the care and treatment of the child.

CLINICAL GROUPS

(1) Those in mild contact, or exposed to massive tuberculous infection, whether they are robust and symptom free, or show a low grade toxemia (lassitude, fatigue, dyspepsia, low fever, poor weight, or cough).

(2) Those showing the "phthisis habitus," thin, angular, long, black eye lashes, white teeth,

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slender-pointed fingers, long pthisical chest, often presenting adenoid facies.

(3) The malnourished, rachitic type with prolonged nutritional injuries, slow gain, anemic, weak.

(4) Those who have had repeated massive upper respiratory infections accompanied by recurrent and prolonged tracheobronchial invasion.

(5) Cases of subacute or chronic bronchitis, or long drawn out bronchial pneumonia with sluggish infiltrations, either following the acute type because of an underlying low resistance or malnutrition; or following in the wake of measles or whooping cough.

(6) The asthmatic type.

(7) A miscellaneous group presenting single or troublesome symptoms significant of bronchial adenopathy.

(a) The persistent brassy pertussoid cough, paroxysmal, with or without dyspnea, often following influenza, or repeated upper respiratory infections.

(b) Stridor, expiratory, regular, loud.[2]

(c) Low grade persistent temperature for no accountable reason. It often follows upper respiratory infections.

(d) Hoarseness (unaccountable).

(e) Expectoration of small amounts of blood.[3]

Whether these symptoms are due to the anatomical relation of the hyperplastic nodes to other structures causing pressure, or to nerve irritation or toxins, is not yet proved.

The true "status lymphaticus" with its enlarged thymus, and general lymphoid hyperplasia as well as the involvement of the bronchial nodes in syphilis, Hodgins' disease and malignancies of the mediastinum will not be considered. These diseases are self-explanatory.

There is no symptom complex indicative of tracheobronchial adenopathy. To diagnose this condition and fully appreciate its etiological significance, a most painstaking history, recording even the trivial details of the above mentioned group, is essential. To this must be added a routine consideration of all the available clinical observations that our present technic and methods "in ToTo" can give, as well as roentgenograms of the chest.

The value of a routine tuberculin test cannot be over-emphasized. When positive, it indicates at least the presence of live tubercle bacilli somewhere in the body,[4] in infancy most probably in the pulmonary region; and the younger the child, the more significant is the reaction. Cutaneous hypersensitivity varies directly with the extent and intensity of the disease.[5] A negative test is exceedingly valuable, unless it occurs a few weeks following measles, whooping cough, influenza, and perhaps several other acute diseases when there is supposed to be a suppressed tissue allergy.[6] The information elicited from this test is most useful when (1 mg. of old tuberculin is injected) subcutaneously after a preceding negative cutaneous or percutaneous application[7] with the proper technic[8] and material.[9]

Supravital studies of the blood to determine the monocyte-lymphocyte ratio may have a prognostic as well as a diagnostic value,[10] when it is suspected that the glands are tuberculous.

The vital capacity in children of 5 to 12 years of age taken by the common spirometer, shows a marked reduction (15 to 42 per cent) in tracheobronchial adenopathy.[11]

While the physical signs are considered by many to be indefinite and unreliable, there are clinicians other than the writer who feels that their evaluation should be attempted, and though the signs are meager, they may be correlated with other findings. Information derived from a minute inspection of the nude child may be suggestive. Of special import is the presence of tuberculides,[12] minute papulo-squamous or papulo-necrotic lesions discretely scattered over the body. The presence of superficial congested veins over the thorax, especially the bluish cord midaxillary;[13] the tendency to a suffocating dyspnea,[14] expiratory with normal inspiration and often with spasmodic cough; the asthmatic type of breathing; a supra-clavicular protrusion, expiratory and generally unilateral when the infant screams or holds its breath during an examination; and supra-clavicular and anterior axillary glandular enlargements are all worthy of recognition.

Whispered bronchophorny (D'Espine's sign)[15] when heard below the seventh cervical spine in infancy and second or even the third dorsal spine in older children,[16] associated with interscapular dullness, especially elicited by Ebstein's[17] touch percussion or by the auscultation-percussion method,[18] signifies the presence of some tissue below the trachea and bronchi, and the vertebral column which transmits the bronchial sound unchanged, whereas under normal conditions it is modified during its

transmission. This tissue is ordinarily made up of hyperplastic tracheobronchial lymph nodes.[19] Obviously, this is not necessarily from a tuberculous infection.

In derivating the true status of the bronchial nodes from a roentgenogram, certain limitations and hazards that often lead to wrong conclusions are met. The recent intensive work done for a better understanding of the cause of the shadows recorded, as described in a number of series[20 21 22] studied, clinically, roentgenologically, and checked at autopsy, must be given full cognizance. Especially is this true of the monumental work of McPhedran, Opie, and their associates, who have developed a different technic which miniminizes the effect on the shadow of the cardiovascular activities in the mediastinum. They use the synchronized method[23] of taking exposures which records and produces a truly stereopticon film. It is in marked contrast to the older methods and permits an earlier recording of infiltrations, glandular and otherwise, and a more clarified decisive portrayal of the arborization of vessels and bronchi throughout the lung structure. Therefore in view of these interpretations roentgengram examination is of diagnostic value only when the following facts are considered.[24 25 26 27 28]

(1) The mediastinal lymph nodes are situated amid structures of roentgenological density equal to their own.

(2) No uncalcified node will be recorded, unless its diameter enlarges more than that of the structures upon which it rests.

(3) Lymph nodes enclosing calcification cannot be discerned.

(4) All calcified nodes that can be brought into proper range of the x-ray by change of angulations and posture will record even the finest deposit.

(5) Demonstrable enlargement of the mediastinal nodes, caused by acute infection, does not record.

(6) The spherical character of the lymph node contour persists in all directions even though the contour may be obscured by the overlying vessels.

(7) Sharply defined dense, round or oval homogeneous shadows, scattered upon the arterial shadow in the adjacent lung field, should usually not be interpreted as lymph nodes, especially if they are symmetrically disposed, multiple and bilateral. These spots are caused by blood vessels that for part of their length present a column edgewise to the film (these can be verified by repeated films at a different angle or by slight rotation, when these shadows disappear).

(8) The width of the mediastinal shadow commonly recorded as a "fuzziness" or "broadening of the hilum," varies with the type of the chest, fat, depth of respiration, cardiac phase, degree of rotation when the film is taken and thymus shadow, and must be qualified.

(9) Cardiac movement and vascular pulsation render indistinct the shadows due to uncalcified intrapulmonary nodes and obscure scantily calcified areas by causing a fullness or blurring of the hilum, which heretofore has been given a pathological interpretation. This can be eliminated by synchronizing exposures with late diastole.

(10) Appearances suggesting edema or infiltrations adjacent to the hilum should be checked by oblique exposures (their location cannot be determined by stereoscopic posterior-anterior films). In the majority of cases, the lesion will be found in the anterior lappet or in the apex of the lower lobe, as here extension from elsewhere or the primary infiltration occurs more often than at other parts of the lung at the levels of the hilum.

(11) Heavy interlobar pleurisy where its shadow crosses the hilum simulates lymph node enlargement.

(12) The degree of obliteration of the characteristic interspace[29] between the heart shadow and the hilum, more on the right, should be noted. In pathological conditions of the hilum, this interspace is changed or entirely absent. However, allowances must be made if there is the slightest rotation in taking the films or when cardiac diseases exists.

(13) And finally the posterior-anterior films, of far more value when synchronized, must be supplemented by lateral or obliques, and often by one at slight rotation or different angulation, to obtain all the information that an x-ray exploration of the chest can reveal.

The recent surveys by Chadwick,[30] Opie,[31] McCain,[32] and others, of large groups of school children showed a tuberculin positive test in 20 to 30 per cent of seemingly healthy children, and in innumerable instances, a pathological condition of the pulmonary nodes. Likewise roentgenological studies have proved that a period of a few months intervenes from the time that tuberculous hyperplasia of the bronchial nodes

takes place, which is non-recordable, until calcification makes them visible. Thus a period exists when the child is harboring a focal tuberculous area which is unrecognizable. Further the caseo-calcareous lymph node occurs without physical signs, and is of the greatest clinical importance.[33] It represent's Nature's effort to arrest a destructive process, the success of which depends upon the maintenance of a high resistance against other types of infection. These facts in conjunction with the known physiological behavior of the child's lymphatic apparatus can definitely establish the existence of potential infection. Therefore it is imperative to approach the infant or child presented for examination, with the keenest observation and detailed analysis of all available data, ever searching for better technic and diagnostic means, to clarify the status of the tracheobronchial pulmonary areas.

It is the potentially tuberculous child that we search for as well as the active case. It is the protean type of progressive extension over long intervals, of non-tuberculous conditions that we are seeking to pick up in diagnosis, as well as the clinically evident type.

Thus stress is laid on the value of repeated detailed examinations, clinical as well as roentgenological, at different intervals up to adolescence. We should be ever mindful that environment may change contacts, that the system may be taxed with a fight against other invading forces, and lastly, of the strain of growth, and the present day sociological demands on the child.*

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TETANUS NEONATORUM: CASE REPORT*

By DALLAS H. ADAMS, M.D.,
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Baby M., the fifth child, of healthy parentage, was born under ordinary conditions at home, December 1, 1929. Strictly sanitary methods were used. The scissors were boiled; the tape was in a sealed package until needed, and the umbilical cord was dressed with sterile gauze. The cord came off on the fifth day. All was well until the night of December 7.

December 8 I was called at 6:00 a. m. The baby was suffering greatly and all simple remedies had failed to relieve him. Upon physical examination he seemed normal in every way, including temperature. Five drops of paregoric were given him every two hours until the pain was eased. He seemed to be a little better that afternoon, but was still fretful.

December 9 I was called again at 6:00 a. m. The baby was very sick and could not nurse. The temperature was 100° and the pulse very rapid. There was some redness around the navel, the jaws were completely locked, and all of the muscles were rigid to some extent. I hurriedly diagnosed the case as tetanus neonatorum, told the parents that it was "lock-jaw," and advised them of the seriousness of the case and of its usual fatality.

At 8:00 a. m. I gave 1,500 units of tetanus antitoxin subcutaneously, ordered five grains of potassium bromid every three hours as a rectal injection, and five drops of paregoric given through the mouth every two hours. A trained nurse was unobtainable, but I had the aid of some good practical women and we started the fight. For a stomach tube we used a No. 12 male catheter, which we introduced through the mouth. This was easy because the baby had no teeth. I ordered the tube to be inserted every two hours for water, and

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diluted milk was given every four hours. At 10:00 p. m. the temperature was 104° and the spasms were severe and ocurred often. I again gave 1,500 units of tetanus antitoxin.

December 10 I was called at 8:00 a. m. The temperature was 105° and the muscles were rigid with the head badly drawn back. I again gave 1,500 units of tetanus antitoxin. At 10:00 a. m. the baby was referred to another physician, who agreed that the case was correctly diagnosed as tetanus and that the baby was very ill. He advised that the injections of tetanus antitoxin be discontinued and that chloral be substituted for potassium bromid as a rectal injection. He also suggested that caffein (0.5 grain with sodium benzoate) be administered by hypodermic every three hours.

At 2:00 p. m. I again took charge and got all of these measures under way. At 8:00 p. m. the temperature was 106.5°, the respiration was very bad, and cyanosis occurred with every spasm.

December 11, I was called at 6:00 a. m. The temperature was 105° and the body very stiff. At 12 a. m. the heart was very bad and the respiration hindered to such an extent that it seemed that the end was eminent. I placed him in a tub of lukewarm water and gave 0.01 grain of morphine as a hypodermic. At 1:00 p. m. I discontinued the use of chloral and gave 1,500 units of tetanus antitoxin. At 4:00 p. m. the temperature was 106°, but the respiration was better. At 10:00 p. m. I again gave 1,500 units of tetanus antitoxin.

December 12, I renewed the use of antitoxin and potassium bromid and gave them in larger quantities. Paregoric was still given. The baby was fed every two hours day and night and I ordered him placed in a hot bath every three hours.

December 13-21, the regular established routine was adhered to except that the antitoxin was given in 2,000 unit doses instead of 1,500 units. It was given subcutaneously at 10:00 a. m. and 10:00 p. m. I diluted all of the antitoxin with normal saline solution (equal parts) and gave it with a 5 c. c. syringe, introducing the needle at the most convenient places. I did not give it in the spine because the patient was not in a hospital, but in a private home. While subcutaneous injections may not act so quickly as intraspinal, I believe they are effective if the antitoxin be diluted with the saline solution. To date there have been no abscesses caused by the needle. As to the navel: I used 5 per cent silver nitrate once a day for four days, after which I used milder remedies, the one I like best being hexylresorcinol.

I kept up the baths every four hours for several days and it was on December 21 that the baby was first able to take food from a spoon. The baby was still stiff to some extent, but had a normal temperature.

December 28, the baby took the breast and was gradually relaxing. He has had a normal temperature since December 21.

The mother did exceptionally well. She had no abnormal temperature at any time.

SPINAL DRAINAGE IN INFANTS AND CHILDREN AS A DIAGNOSTIC AND THERAPEUTIC MEASURE*

By OLIVER W. HILL, M.D.,
Knoxville, Tenn.

In the October issue of the *American Journal of Diseases of Children*, Dr. A. Levison of Chicago published a paper with the title "Cerebrospinal Fluid in Infants and Children." I have attempted to make my address a more specific study of the same subject.

One of the most difficult problems that confronts the physician is the diagnosis and management of acute, subacute or chronic intracranial conditions. Spinal drainage is an aid to diagnosis and may furnish some relief of symptoms. While studying intracranial hemorrhages of the newly born, we observed that lowering the intracranial pressure by repeated drainages influenced the symptoms to a marked degree. This led us to wonder just what influence this would have on delayed manifestations in older children, such as the spastic paralysis known as Little's disease, or upon the acute and chronic conditions which are accompanied by hypertension, such as epidemic encephalitis or polio-encephalitis. We began a series of investigations on cases that presented themselves to us from time to time; this study running through a period of three and one-half years and embracing 42 cases, which we beg leave to report. This study includes some 200 spinal drainages. No cisternal or ventricular drainages are included. Only Wassermann tests and cell counts were done as a routine. The 42 children had been sadly neglected and presented some pitiful symptoms, both mental and physical, with feeble brains and distorted bodies. The investigation led us far afield sometimes, but it opened up new avenues of information and research. We also found that we had much erroneous information. For instance, we are taught that the spinal pressure will, like Banquo's ghost, "not stay down." This we found in many instances not to be true, after repeated drainages. Why repeated drainages bring about a permanent, normal pressure, was, and is still, a matter for speculation.

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Patients with motor paralyses have an edematous brain under various degrees of increased pressure. There is usually present along the supra-cortical veins the organized residue of a previous subdural or supra-cortical hemorrhage which was more extensive than Nature was able to absorb or eliminate. It is said that approximately 80 per cent of the spinal fluid is excreted through the walls of the supra-cortical veins. This partial blockage of the normal excretory apparatus will aid in explaining our chief pathologic finding, namely, the edematous condition of the brain under more or less increased tension. It is not illogical to assume, however, that this hypertension may be partially or wholly due to a general imbalance or disorganization of the endocrine system through an interference or injury to some of the centers of efferent fibers which results in a varying amount of hypersecretion of cerebrospinal fluid. The fact that the administration of thyroid extract lowers the intracranial tension and aids in maintaining a normal pressure, may be explained along these lines. Another explanation is purely mechanical. It is reasonable to believe that the excessive pressure of the fluid against the cortical veins and their villi, encased in the more or less unyielding skull, would in itself cripple the function and interfere with the absorption of the normal amount of fluid. This condition could conceivably be improved by repeatedly relieving this pressure.

The cerebrospinal fluid is secreted by the choroid plexuses of the two lateral ventricles; from these it flows through the comma-shaped foramen of Monro to the third ventricle. Here it makes its exit by way of the foramen of Magendie and the two lateral slit-like clefts of Luschka to the subarachnoid spaces at the base of the brain beneath the tentorium cerebelli. From these basal cisterns most of the fluid rises over the surface of the midbrain through its notch in the tentorium. A small portion descends along the ventral aspect of the spinal cord and returns to augment that which bathes the cerebrum. Most of it is absorbed by the arachnoidal villi. One function of the spinal fluid is to regulate or equalize the pressure of the subarachnoid space and the ventricles of the brain.

Let us now turn our attention to the pressure under which the cerebrospinal fluid exists and its relation to the pressure in the arteries, capillaries, veins, and in the dural sinuses.

Studies and estimates of the pressure of the cerebrospinal fluid have been made by a large number of observers. The figures that are given disclose a wide range of variation. Perhaps it is fair to conclude that it is about one hundred mm. of water. Doubtless the differences in figures are due in a large part to differences in the methods of investigation employed. For us, however, the fact of physiologic importance is that the cerebrospinal fluid normally exerts a pressure on the wall of its containers, and that this pressure is greater than that in the venous sinuses. Absorption by the latter of the cerebrospinal fluid through the arachnoidal villi is thus directly favored. The pressure of the cerebrospinal fluid is also greater than that in the lymphatics, which likewise favors the theory of absorption. It has been estimated that the pressure in the cerebral capillaries is six or seven times as great as that of the cerebrospinal fluid; so that it is extremely improbable that any absorption takes place in the capillaries. The pressure in the cerebral arteries is also notably higher than that of the fluid; that in the cerebral veins is clearly higher than that in the sinuses. The cerebral arteries, capillaries and veins, it should be borne in mind, have no relation of absorption with the cerebrospinal fluid. The relations of the latter are merely with the sinuses and with the lymphatics of the cranial nerves.

The pressure of the spinal fluid is doubtless maintained by a continuous supply, furnished largely, as we have seen, by the choroid plexuses, though other sources are not excluded. Observations by Marriott with diuretin and by Dandy, after choroidectomy, with other studies, establish the choroid as the pre-eminent organ of secretion of the cerebrospinal fluid.

While it is undoubtedly true that the most conclusive proof of the existence of an intracranial tension is furnished by lumbar puncture, it is to be remembered that if this examination is to be of value, it is necessary that it be made according to certain rules. The pressure must be determined as accurately as possible.

We selected 40 children of varying ages, from one year to three years, most of them institutional children, for spinal drainages. We used both the mercurial and the water manometers, and decided that the water was more suited to our purpose as it was more easily read, less complicated, and for that reason more accurate. All were taken with the patient in a horizontal position, a light anesthetic being used when in-

dicated, to bring about complete relaxation, as we know that the venous pressure and the spinal pressure are closely allied. By that means we established what we consider a normal pressure, which we concluded was 90 to 100 by water manometer. This, of course, confirmed the opinion of a number of other workers. However, there seems to be a considerable difference of opinion as to what constitutes a normal pressure. Our observations lead us to believe that the age, mental and physical condition, independent of any definite abnormality in the brain, influenced this pressure very little or only temporarily.

The amount of fluid withdrawn was governed entirely by the pressure, except in individuals whose pressure was exceedingly high, that is, above 400 by the water manometer. In these cases it was reduced to 200 or 225, and three or four days later to a lower level. This procedure was repeated until the pressure was about 100 which, as I said, we consider normal. In cases of long standing high pressure the interval between drainages was of course much longer, varying from three to six weeks, always keeping in mind the dangerous effects that sometimes follow this procedure.

In children under two years of age we found it more expedient to enter the spinal canal at a slightly higher point than is designated by textbooks. We favor the interspace between the first and second lumbar vertebrae.

Absolute asepsis must at all times be observed and all possible care must be exercised to avoid trauma.

We feel that spinal drainage properly carried out is practically without danger. In our own series, we have had no accidents nor untoward symptoms traceable to this operation. Let it be understood that we realize there is some danger in certain cases, as in spinal or brain tumor, or abscess, and competent clinicians have reported an occasional death following spinal puncture, but the beneficial results overbalance the dangers. It is also to be remembered that hypotension exists sometimes in certain cases of brain trauma, and the nervous symptoms are exaggerated by the lowering of the pressure. This makes us the more certain that control of the intracranial tension affects the patient's well-being.

To evaluate the efficacy of this procedure, one has to take into consideration all symptoms, both subjective and objective, that present themselves at different intervals.

Other methods of controlling this hypertension were utilized. As you remember, Dr. Chas. H. Frazier, in 1915, published the results of some investigations on this subject in which he made the statement that thyroid extract seemed to inhibit the excessive flow of the cerebrospinal fluid. We therefore administered this with the thymus extract in accordance with the method employed by Dr. William Sharpe.

CASE REPORTS

Case I.—E. H., Young Harris, Ga., a white male child, age three years, weighed at birth eleven pounds. He was the fifth of six children, all of whom were living. He was breast fed. He had visited numerous clinics and the parents had been informed that no improvement should be expected.

He was brought to our office suffering from the following symptoms: extreme excitement or nervous irritability, with restlessness by day and especially at night; inability to sleep and numerous modified transient convulsive seizures occurring both by day and by night. He required constantly a nurse or attendant. He frequently cried out at night. The father described his attacks as nightmares. The symptoms had lasted one and one-half years and had gradually increased in intensity to the present stage.

The mother and father were living and well. No neuropathic history was obtainable. The home conditions were good.

The child was the product of difficult labor. Symptoms of cerebral birth injury were present for the first two weeks of life (not considered serious at the time), after which the patient seemed normal until about one year of age, when the symptoms described began to appear in mild form. Other points in the history are irrelevant.

The patient was well nourished and developed for his age. Heart, lungs and abdomen were normal. The reflexes were weakly positive throughout.

Laboratory Findings.—Blood counts, blood and spinal Wassermanns, stool and urine examination were all negative. Spinal fluid pressure was found to be 250 by water manometer. The eye grounds were not examined after the spinal fluid was found high, but by inference would have shown some degree of chocked disc. The patient was placed on thyroid extract and the spinal pressure lowered on three successive occasions. This was followed by a rapid and complete recovery.

Case II.—J. C., a white male child, age nine months, weighed at birth eight pounds. He was entirely breast fed. He was the younger of two children. There was no history of previous illness.

He had vomitied excessively for four days. He was extremely restless and was having convulsions.

The family history was negative. This child had been perfectly well four days before he was brought to the office, when vomiting and nervousness followed by convulsions began. The temperature was slightly elevated.

Laboratory findings were negative.

Physical examination was essentially negative except that he had an anxious expression and a squint of the left eye.

Spinal drainage revealed a bloody fluid under 210 mm. of water pressure, which was reduced to 100 mm., about 20 c. c. being removed. Improvement was noted early and the patient made an uneventful recovery.

Case III.—S. K., a white female child, age two years, was referred by Dr. McKnight, of Jacksonville, Florida. Her birth weight was six pounds. She had been breast fed. Delivery was apparently normal with no history of birth injury. The patient was the younger of two children.

She was unable to sit alone, walk or talk, and had spastic paralysis of the inferior extremities and a nervous irritability.

Physical examination revealed a typical picture of a delayed manifestation of birth injury. She had an internal squint. Laboratory and other examinations were negative.

The child at present (one year later) walks, talks and is rapidly approaching normal. There remains some slight spasticity of the extremities with the internal squint of the eye persisting, but less pronounced.

Treatment.—Initial spinal puncture revealed a pressure of 280 mm. of water. The fluid was otherwise normal.

The patient was put on thyroid and thymus tablets and during the course of one year approximately ten spinal drainages were performed, each time reducing the pressure nearly to normal. We found a gradual decrease in the maximum pressure as the series of punctures advanced.

Case IV.—J. M., a girl, age eleven years, an only child, normally delivered, referred by Dr. Gamble, Maryville, Tennessee, had a history of epilepsy on the father's side of the family. The mother was rather neurotic. The patient had had the ordinary diseases of childhood.

Three months before she came to the office the patient began to have modified convulsions, sometimes as many as five in one day. On occasions she became wildly excited and fought anyone who came near. She was extremely nervous and irritable at all times.

Physical examination was essentially negative. The patient was somewhat underweight.

First spinal puncture revealed a pressure of 300 mm. of water. This was reduced to 100 and the patient was placed on thyroid and thymus.

Three or four subsequent punctures were done, showing gradual approach to normal. With this, the convulsions gradually ceased, nervousness and excitement abated and the child is now in school, apparently normal.

Case V.—B. J. L., a girl, age seven years, was referred by Dr. C. W. Strauss, of Copperhill, Tennessee. She was normally developed and well nourished. She gave a history of normal birth and childhood up to the present time.

She was brought to the hospital, presenting a typical case of encephalitis, delirious, hyperpyrexic and extremely nervous.

Spinal puncture revealed an elevated pressure with a clear fluid and increased cell count. The pressure was reduced, followed by lessening of the above symptoms.

During convalescence, as we expected, a spastic hemiplegia of mild degree developed. The spinal pressure was at this time 20 mm. of water, which was reduced to normal. Three succeeding taps were made until the pressure approached normal.

The paralysis has gradually cleared up and the patient at present suffers no mental nor physical sequelae of consequence.

Case VI.—E. E., of Baskersville, North Carolina, a male child, two years of age, had a negative family history. There was a history of a long labor with a "bruise" on the side of the head and a formed hematoma which was incised. He had whooping-cough at ten months of age. He had never attempted to walk.

He was a well developed child, weighing 29 pounds. He had a spastic paralysis of the muscles of the left forearm. Both lower extremities were spastic, with special contraction of the right tendo Achillis. The child was so afraid that we were unable to make a satisfactory physical examination. Spinal drainage revealed a pressure of 280 mm. water, a normal cell count, and the Wassermann was negative. He was given thyroid extract gr. 1 and thymus extract gr. 1 each day. Five weeks later the spinal fluid pressure was 175 mm. water. The child was much improved. One month later the child could walk with difficulty. At this time he contracted scarlet fever, which was complicated with adenitis. This persisted for three weeks, at the end of which period spinal drainage revealed a pressure of 150 mm. water. The child was in fair condition, being able to walk. At this date, four months later, the child walks and talks almost normally and bids fair to be a happy, useful citizen.

Case VII.—D. D., a male child, age fourteen months, was referred by Drs. Petty and Peyton, of Lynch, Kentucky. The family history was negative. The child had had suppurating ears at six months of age, but evidently completely recovered.

He was attacked, while eating, with convulsions which continued for twenty-four hours. The mother thought there were thirty in all.

Physical examination showed a slightly underweight, highly nervous child, with restless muscular movements, an anxious expression, a convergent squint of the left eye, and spasticity of the fingers of both hands and the left wrist. Dr. T. D. McKinney, of Nashville, saw the child in consultation. We thought of a brain abscess following a middle ear infection. The x-ray was negative and the eye-grounds were negative. Spinal drainage was done. The fluid was clear, and under pressure of 525 mm. water. The cell count was normal. The Wassermann was negative. Drainage repeated in twenty-four hours showed 315 mm. pressure. Drainage repeated in forty-eight hours showed 200 mm. pressure, and one week later 150 mm. One month later the pressure was 125 mm. water and the child was apparently normal with no spasticity. The squint had disappeared. Ten months later the child was reported well. He weighed 25½ pounds.

SUMMARY OF FINDINGS IN 42 CASES

Four patients did not return for treatment and observation.

Twelve did not improve.

Thirteen improved slightly.

Nine improved markedly, being normal except for orthopedic adjustments.

Four became apparently normal.

CONCLUSIONS

(1) Spinal drainage is a much neglected diagnostic and therapeutic measure, and should be employed more frequently than it is at present.

(2) The medical profession neglects the type of patients above mentioned, passing them up as incurable, prescribing some palliative measure.

(3) Studies of a small number of cases are not conclusive, and further observations are required. We hope to present these observations at a later period.

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DISCUSSION (*Abstract*)

Dr. J. Buren Sidbury, Wilmington, N. C.—Lumbar punctures are of definite value from a therapeutic as well as from a diagnostic standpoint. I have seen a lumbar puncture immediately stop a convulsion which had not been benefited by morphine and only temporarily by chloroform. In meningitis it is a necessary step towards making an accurate diagnosis.

Lumbar puncture in the newly born, who has had a hard labor, may be the means of saving life and allowing normal mental and physical development. If this procedure is to be of greatest value it must be done in the first few days of life. If the hemorrhage has occurred below the tentorium and the blood has not clotted, lumbar puncture can cure the condition.

Brain tumors should always be thought of in doing a lumbar puncture and we should be cautious about drawing off spinal fluid. It should be withdrawn slowly and enough to meet the immediate need. But brain tumors are relatively rare conditions in our practice. They should not deter us from a puncture when one seems indicated.

Dr. Hill has presented a number of interesting cases and I feel that a report on their progress three or four years from now will be of still greater interest.

Those cases in which I have done repeated lumbar punctures for "old intracranial injuries" have not responded very much. Frankly, I feel that the improvement that they showed from month to month was not more than was seen in other cases that were not punctured. These cases number some 25 or 30 and they received lumbar punctures every six to eight weeks for one year. They also received thymus and thyroid gland in powdered form.

Dr. Eugene Rosamond, Memphis, Tenn.—In typical Little's disease, of course, most of us believe that in the acute stage of injury we are dealing not only with hemorrhage in the brain, but with contused brains, with torn nerve tracts, and with other injuries which Nature has very little chance to improve. In the initial stage of hemorrhage, I do not see how spinal puncture can be of any use. If we relieve the pressure it seems to me that we are inviting further hemorrhage. After blood has been administered in the cases which have delayed clotting time, and clotting has taken place, or after a certain period during which I think these children should be treated just as we would treat an automobile head injury, by letting them alone, by putting ice caps on the head, by giving magnesium sulphate per rectum, by giving concentrated glucose intravenously, and by other measures,—after clotting has taken place, then a spinal drainage to remove the blood in the spinal fluid might do good. After the stage of spasticity has developed, of course most of us think we are dealing with torn nerve tracts and contused brains, and if pressure remains high decompression operations have been the thing that we have depended on.

Dr. Hill's results have been astonishing, and I, too, shall be glad to hear of these little patients later.

Dr. Philip F. Barbour, Louisville, Ky.—There was quite a discussion at the American Medical Association meeting at Atlantic City some years ago as to the value of lumbar puncture in cases of intracranial hemorrhage, and one of our distinguished pediatricians in this country advocated leaving these cases absolutely alone. But I think most of us feel that if there is very much pressure some relief, at least, will be secured by lumbar puncture.

Dr. Rosamond has brought out the other treatment that these cases should always have: the administration of blood in order that clotting may take place and to prevent further hemorrhage into the brain after the pressure has been relieved.

I think in cases of spastic paralysis it would be well if we could use measures which favor the absorption of fluid as well as those which relieve pressure. If it is true that in these cases the absorption of fluid is below normal, it is possible that we could improve it by relieving the inflammation of the meninges.

I have always been under the impression that spastic paralyses were due to an injury to the brain tissues from the hemorrhage. It is not quite clear to me how removal of spinal fluid can undo the physical changes in the brain so that Dr. Hill's treatment rather goes against the accepted ideas.

Dr. Aldert S. Root, Raleigh, N. C.—I should like to express a difference of opinion from that which is held by Dr. Rosamond. The only way we are going to help these cases of intracranial hemorrhage is by performing a lumbar puncture early, before the blood clots, certainly within the first ten days after the child has been born, because it is the only hope then of relieving the cause or removing the hemorrhage. It should be repeated every day until the fluid is no longer bloody. When the blood clots, the damage of a permanent character will have been done. I think many of these cases show a delayed clotting time, and in all of them an injection of whole blood should be given at the same time the lumbar puncture is done.

My observation in chronic, older cases has been very much the same as Dr. Sidbury's. I have punctured spastic cases which had a high spinal pressure and have gotten no results, either in so far as the mentality or the spastic condition of the child was concerned.

Dr. John A. Foote, Washington, D. C.—It was in 1918 that the first paper on spinal drainage in intracranial hemorrhage was read, and I think it is too bad that proper credit has not been given in the literature generally to this paper, by Dr. Brady of St. Louis. Dr. Brady read a very excellent paper on spinal puncture following intracranial hemorrhage. I remember discussing that paper and reporting the fact that I believed these cases were sometimes dependent on a general hemorrhagic tendency of the infant. That paper aroused some discussion at the time. Two years later I published a report on the hemorrhagic tendency as a cause of intracranial hemorrhage of the newly born and reported seven cases clinically. A little while after that publication Dr. Rodda reported a number of cases and a new and accurate coagulation test. Later a number of other papers were written on this subject. I have never lost my interest in it. I do believe that the hemorrhagic tendency has a good deal to do with some of these cases, in spite of what Sharpe and others say; and I believe that repeated lumbar puncture will do a great deal to relieve them if the hemorrhage is intratentorial. I have had a few cases where the puncture was not done until a month or more after the injury. While it is true that you get clotting of the blood, the blood in those cases has not the typical serous appearance, but has a rather grumous appearance. I believe that drainage at that time does good because it removes a certain amount of pressure that could not be relieved otherwise. As to the later drainage, I do not know. Some children who have mental defects following intracranial hemorrhages are microcephalic; they have small, inflexible heads. I believe we ought to begin at the other end; I think they have the hemorrhage because they have small, inflexible heads, and you will get more hemorrhage in these children than in those with normal heads that are flexible and yield to the pressure of the uterus.

I am inclined to think that some of the results Dr. Hill has obtained are due to the very good, intelligent care he has given these children rather than to late lumbar punctures.

Dr. Walter E. Dandy, Baltimore, Md.—Spastic paralysis, I feel, is not due to hemorrhage on the surface of the brain; it is due to injury in the depths of the brain. Therefore one can accomplish nothing in the way of permanent cure or permanent benefit by withdrawing bloody fluid from the spinal canal. We do not give Nature credit for the results which obtain when the patient is let alone.

In the treatment of injuries to the brain I do not believe that one really helps the patient by spinal drainage, either in saving life or in preserving function. Most of the hemorrhage which is of any consequence is located outside the subarachnoid space. These hemorrhages are over the surface of the brain and are in the subdural space, which has no connection with the spinal canal. One removes fluid by lumbar puncture, getting a few corpuscles and a little tinge to the fluid, but the main hemorrhage is not touched.

In the infant the white matter, which is bearing the brunt of the attack, is so much softer than in the adult that there is a good deal of cerebral injury. I should say, from watching cases of this type, that one gets perfectly astounding results if they are let alone. But that depends upon the nature of the injury, and it is not changed one bit by spinal drainage. It is hard to draw conclusions from statistics. A tremendous number of cases is needed before one can feel justified in drawing a conclusion, and the personal equation plays a tremendous part in the deductions we make. I am distinctly in favor of doing the least possible for injuries of the head, for only too often the treatment produces additional injury to the brain.

Dr. Hill (closing).—These cases were not all Little's disease. Some of them were the peculiar paralysis that follows encephalitis and poliomyelitis. Many were more mental and nervous cases than physically ill. As to the question of whether drainage relieves the symptoms, it seems to me that is shown by observation of the patients. I hope in a few years to give the follow-up results of some of these children.

How this treatment benefits the patient is largely a matter for speculation, but we feel that some relief is given, and that in our feeble way we have relieved children who would otherwise have gone through life absolute derelicts. One of the children, particularly, two years old, was unable to talk or walk. Six months after beginning treatment he began to talk and is apparently much improved in every way, as he can make himself understood and walks with little difficulty. However, the most marked results are in the children presenting highly nervous symptoms with anxious expression, jerky muscular action and extreme restlessness: the distractable, hyperactive child with violent temper and other behavior traits that characterize the so-called anti-social individual of later years. We may be instrumental in curing some of these tendencies in the making.

EFFECT OF PARTIAL SANITATION ON INFESTATION WITH INTESTINAL PARASITES IN SOUTHWEST VIRGINIA*

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Previous studies on the control of hookworm infestations have emphasized the desirability of sanitation concomitant with treatment. Smillie,[8] Hill[5] and others demonstrated this point clearly

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*From the Department of Helminthology of the School of Hygiene and Public Health of the Johns Hopkins University. This study is part of a program of researches on ascariasis in children which is being conducted under the auspices of the National Research Council with the aid of a grant from the American Child Health Association.

*The writers wish to express their appreciation to Dr. W. W. Cort for helpful suggestions and criticisms during the progress of the work and the preparation of the manuscript. Dr. W. R. Culbertson, Director of the Wise County Health Department, actively assisted us in the field work and, together with Dr. W. A. Brumfield, made available the records of the surveys made in 1917 and 1921.

by use of quantitative measurements of infestations. In a recent work on the subject Cort and his co-workers[4] showed that in Panama the pit privy was fairly effective in controlling hookworm, but apparently failed to make any considerable reduction in the Ascaris infestation due to the pollution habits of the children.

During the summer of 1928 we had an opportunity to compare the egg counts made of school children in Wise County, Virginia, with the incidence found in surveys in 1917 and 1921, when sanitary measures were just being introduced into the region. In another paper on ascariasis in Virginia[3] attention was called to the fact that this County is one of the best sanitated in this entire mountain section. Privy building in Wise County as a part of the sanitary program began with the advent of the full-time health department in 1916. Many of the mining camps now have modern sewage systems and all have at least the pit privy. The more accessible rural areas are now fairly well sanitated and even in the more remote parts of the County some pit privies have been built. However, in spite of the intensive work of an active health unit for over a decade the Ascaris infestation in many parts of the County approaches tropical figures in both incidence and intensity.[2] Over 48 per cent of the 2,152 individuals examined in the region harbored Ascaris. In the two rural areas discussed in this paper the average number of eggs per c. c. of feces was 14,600 and 23,400 for children from 0-14 years, while in Panama the figures for similar groups varied from 13,350 to 56,780 for various communities. The incidence for the whole of the Wise County series is somewhat reduced by the inclusion of some really sanitated mining camps and families, but the areas herein discussed in particular are typical of the major part of the County.

In this paper incidence figures gathered by Dr. W. A. Brumfield in 1921 and by the State Branch Laboratory in 1917, when the privy was just being introduced into the County, are compared with those obtained in 1928 by the field staff of which the writers were members. In the first series diagnosis was by the simple smear, while in the latter series the Stoll dilution egg count method was used.[10 12] The two methods give fairly comparable results when only incidence figures are considered. Whatever difference there was would probably be in favor of a more accurate diagnosis by the dilution egg count.

TABLE I

A comparison of the incidence of Ascaris, Trichuris and hookworm in rural areas in Wise County, Virginia, in 1921 with similar figures for 1928.

			Per cent Positive		
		No. Ex.	Ascaris	Tri-churis	Hook-worm
Pound	1921	157	74	52	29
	1928	229	68	42	17
Virginia City and Sandy Ridge	1921	387	75	46	18
	1928	136	65	22	4
Total	1921	544	75	47	20
	1928	365	67	34	12

Table I compares the incidence of the three common species of worms in a series of rural children (0-14 years) in the 1921 and 1928 surveys. In both groups most of the examinations were made through the schools and hence include approximately the same age distribution. In the Pound the examinations in the two series were from identical schools, but in the Virginia City-Sandy Ridge area some schools in each series are not included in the other. In both areas, however, strictly rural populations in the same general region are included in both surveys.

It is at once evident from a study of *Table I* that the Ascaris incidence in 1928 is essentially the same as in 1921, while the hookworm incidence has dropped off noticeably in the seven years. It is a well known fact that incidence figures alone will often give a fallacious picture of a worm infestation.[8] However, it seems logical to believe that in this case the incidence figures may be taken as very nearly a true index of the relative infestations because in the 1928 series the egg counts for Ascaris showed a heavy worm burden as well as a high incidence, both being comparable to similar figures from Panama as already noted. It seems probable, however, that there may have been some reduction in worm burden over this period since, in some of the families included, the privies were used by all members with a resulting low Ascaris infestation. The low hookworm incidence in 1928 was accompanied by a correspondingly low egg count in positive cases. No clinical cases were seen and the infestation could hardly have been much lower than it was in 1928 and still have maintained itself. It seems evident, then, that lowered hookworm incidence from 1921 and 1928 actually indicates a considerably lowered hookworm infestation and that the Ascaris infestation, just as the incidence figures show, was but little reduced.

To explain why the installation of the privy has played a differential role in reducing the incidence of hookworm and not that of Ascaris

one must take cognizance of the differences in the mode of dissemination of the two parasites. Ascaris is primarily a children's infestation[3 4] (Section VIII) and is spread by the children depositing their stools close to the houses where they continuously play.[1 2 3] In these studies it has been clearly demonstrated that the Ascaris burden is a household or family matter and in many cases is independent of the presence or absence of a privy. In the Virginia City-Sandy Ridge area (*Table I*) most of the homes have privies due to years of effort on the part of the sanitary officials, but their use by children is in most cases negligible. In the Pound district privies were fewer, but the Ascaris burden was no heavier. In the absence of a privy the parents and older children usually retired some distance from the house to deposit the stools. These individuals usually made use of a privy when one was present. On the other hand, children of pre-school and early school ages usually defecated in the dooryards, in open spaces under the houses or wherever they happened to be playing regardless of the presence or absence of a privy. The children of these age groups have the heaviest Ascaris burden and hence heavily seed the soil of their dooryards and playgrounds with Ascaris eggs, which brings about their own reinfection and the infection of others. Many embryonated Ascaris eggs have in the course of our Virginia studies been isolated from such environments. From three grams of the surface soil of one pathway where young children played we isolated 890 Ascaris eggs, 70 of which were embryonated. It has been demonstrated experimentally by one of us[6] that these eggs can remain viable over summer and late into the winter. More recently viable Ascaris eggs have been isolated from an experimental plot exposed to natural conditions in this area over summer and winter.

These Ascaris eggs lie on the surface of the soil as potential infestations needing only to be transmitted to the mouth. A child playing in such an environment must be constantly swallowing many of these microscopic eggs when he sucks his unwashed fingers and eats with unwashed hand. It is not uncommon to see children sitting on the egg-infested soil and eating a piece of bread or fruit which has dropped thereon. The mystery is not the heavy Ascaris infestation, but rather that the incidence is not higher and the individual infestations are not heavier.

Whereas the Ascaris gains entrance to the body in the egg stage through the mouth, the hookworm in the larval stage actively penetrates the skin of the host, though it can set up an infestation when swallowed in this stage. The differences in the distribution of the two parasites are chiefly due to the fact that the hookworm larvae, which hatch from the eggs a few days after being deposited, are much less resistant to environmental conditions than the Ascaris eggs. Stoll[11] and others have demonstrated that a moisty mellow sandy or loam soil is a good culture medium for hookworm larvae, while heavy clay soils are entirely unsuited for the free living stage of the worm. Recently Rickard and Kerr[10] have shown that in Tennessee clinical hookworm disease is absent from regions having predominately a clay soil. Only in a few situations in the areas studied in Wise County is there to be found a sandy soil suitable for the establishment of hookworm infestation. In addition, the roughness of the mountain area with the yards on steep hillsides, the rather long winters and comparatively cool summers would seem to be somewhat unfavorable for hookworm dissemination. Therefore, it is not surprising that severe hookworm disease has apparently never been present in the region and what infestation there was has yielded rather readily to partial sanitation. When the adults and older children use the privies there is wiped out the only important source of infection because the barren pathways and dooryards where the young children deposit their stools are unsuited as a culture medium for hookworm larvae.

Table I shows that the hookworm incidence in 1921 in the Virginia City areas was practically as low as it was in the Pound in 1928. In all probability this reflects in part at least the effects of early sanitation. When the sanitary pit privies were first being built in 1916 in Wise County, this work was done in the Virginia City area and the sanitary teachings of home mission workers there have done much to maintain the buildings and promote their use. On the other hand, the Pound was the last area in the County to receive the attention of the sanitary officers. Only in recent years has the building of pit privies been stressed there, and less than half the homes are so equipped.

TABLE II

A comparison of the incidence of Ascaris, Trichuris and hookworm in a mining camp in Wise County, Virginia, Esserville, in 1917 and 1928.

		Per cent Positive		
	No. Ex.	Ascaris	Tri-churis	Hook-worm
1917	59	69	27	7
1928	67	51	7	3

Table II gives the figures for the worm incidence in Esserville, a small mining community. Many of the homes here had pit privies, but as in the rural communities they were not often used by young children. Here the soil is hard and packed throughout, probably accounting for the fact that little hookworm infestation was found. In part of this area the dooryards were covered with cinders[3] which one of us[6] found were unsuitable for culturing Ascaris eggs when these were exposed to the direct sun. In homes of this type there was little Ascaris infestation and the community incidence was thus reduced in the 1928 series.

Trichuris like Ascaris infestations depend primarily for their spread upon gross soil pollution where the developing eggs can readily be conveyed to the mouth of the prospective host. However, the egg production of Trichuris is lower than that of Ascaris and one of us[9] has demonstrated that the eggs are less resistant to drying. In the 1928 survey, no heavy cases of Trichuris infestation were found in the groups considered in this paper, and it may be that the figures given in *Tables I* and *II* indicate a reduction in the infestation as a result of the sanitary measures. Here again we are dealing with a parasite less well adapted than Ascaris for spreading under the conditions found in the regions under consideration.

SUMMARY AND CONCLUSIONS

The introduction of pit privies in the mountainous areas of Virginia has apparently been effective in reducing the hookworm incidence because when present they are usually used by older children and adults who in the absence of a privy retired to protected shaded areas which frequently were of the proper soil consistency to serve as culture media for the free living stage of the hookworm. The introduction of the privy, however, has apparently done little to control the Ascaris burden in many areas because regardless of the presence or absence of a privy the younger children deposit their stools close to the house and in playgrounds where the eggs are readily conveyed by dirty hands and food to the mouth. The pollution of such areas does not to any extent at least spread hookworm, because the hard, rather dry soil in these places is unsuitable for the development of the hookworm larvae.

The building of privies is a fundamental step in the control of infectious diseases spread by soil pollution, but to be successful they must be used exclusively. In the regions just discussed the situation is difficult because many of the people are doubtful of the value of a privy. In many cases they feel that it produces an unwise accumulation of odorous and obnoxious waste which if daily dropped in various parts of the yard would be destroyed by insects or chickens and washed into the soil by the rains. Those adults who do consent to build and use the privy often do not feel sufficiently convinced of its beneficial results to take any time to teach the young children to use it. Furthermore, as has already been pointed out,[2] the pit privy as usually built is structurally ill adapted to children's use and frequently inconveniently situated. The seat is too high and the hole too large to be conveniently and safely used by young children. A lower seat or a step to part of the main seat with a smaller hole for the convenience of young children should certainly be encouraged. The real problem, however, is the slow process of educating these people to consider the sanitary privy as one of the most necessary buildings on the premises of every family and its use taken as a matter of course. When this is accomplished, and not until then, will human excreta be so disposed as to protect not only against Ascaris infestation but against bacterial diseases as well.

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ACETONURIA IN PREGNANCY: INDUCED ACETONURIA AS A TEST FOR PREGNANCY: STUDY OF THREE HUNDRED CASES*

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In 1923, Pritzy and Lichtman[1] reviewed their work on the tests for pregnancy and described in detail the method of Novak and Porges, which they had subjected to study and test. No other method, including the Abderhalden, has stood the test of practice. Novak and Porges work rests upon the ease with which an artificial acetonuria may be produced in the pregnant woman, and much earlier than in the non-pregnant state. During the pregnant condition, the oxidation of fat requires a larger quantity of carbohydrates than during the non-pregnant state, to produce complete combustion. Our tests show that the non-pregnant individual requires at least forty-eight hours to produce acetone, and the pregnant woman requires much less time. This fact is the basis of our modification of the work of Novak and Porges.

With the cooperation of the local physicians, three hundred cases have been studied in this laboratory, and the results seem to show that the test, carefully carried out, is a valuable aid to the physician when called upon to make a diagnosis of pregnancy. These cases studied, appeared at the offices of the physicians at various periods after the cessation of the normal menstrual function, and were given the following instructions for a test diet. Upon arising the following morning, the first urine voided was to be saved, and marked No. 1. At 8 a. m., the breakfast as follows: cereal with cream and sugar, buttered toast and coffee with cream and sugar or milk. This insures plenty of fats and sugar. After this breakfast, there is to be no further intake of any food substance, nothing but water to drink until 5 p. m., when another urine specimen is voided and marked No. 2. These are sent to the laboratory. It is important that the patient be warned that "no food after breakfast until 5 p. m." means absolutely nothing but water. No chewing gum, or "pickings." (Several tests that were later checked, that gave negative results, were discovered to be positive when the patient abstained from all food.)

The specimens were tested for acetone by a modification of the Rothera test, which is easy and accurate. The technic is as follows:

One gram of sodium nitroprussid is weighed out, and finely ground in a mortar; 500 grams of ammonium sulphate (powdered) is weighed out, and added, a little at a time, intimately grinding and mixing. When about 100 grams of the ammonium sulphate has been added, the whole is emptied upon a large sheet of clean paper, the rest of the ammonium sulphate added, and all intimately mixed. This is bottled and kept tightly corked. The test proper is as follows:

About 1 inch of the mixture prepared as above is poured into a clean dry test tube. Add about 3 inches of urine, and invert repeatedly until dissolved. Overlay with 2 c. c. of full strength ammonia water. Acetone is demonstrated by a violet to purple color developing at the junction of the two fluids.

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*From the Laboratory of the Hardy Sanitarium, Ardmore, Oklahoma.

A positive test for pregnancy is shown by the absence of acetone in the No. 1 tube (morning specimen) and the presence of acetone in No. 2 tube (5 p. m. specimen). A negative test is shown by the absence of acetone in both tubes.

Occasionally, we have found a test where both tubes have given an acetone reaction. This denotes an acidosis which must be eliminated before a test can be relied upon. These few cases, upon further tests, were found to give a positive pregnancy test. At the time the tests were made, the time of the last menstrual period was noted, and the earliest elapsed time was 27 days from that date. The longest period from the date of the last menstrual time was 187 days (a negative test, which is still clinically and physically negative, after a further five months).

A summary of the three hundred tests follows:

Of the 300 cases studied, there were

257 positive.

43 negative.

Of the 43 negatives

40 were negative clinically, and also upon examination six months after test.

2 were ectopic pregnancy, which ruptured and were operated upon.

1 examined three months after test was physically negative, but has since been lost track of.

Of the 257 positives

7 were premature deliveries, all living.

21 induced abortions, afterward hospitalized.

16 definite histories of miscarriage, doctors being in attendance.

1 uterus full of clotted blood, but careful examination disclosed no evidence of a foetus.

212 normal deliveries.

The positive test, which was curetted and showed no trace of a foetus, was the only fallacy among the positives, and the two ectopics which gave a negative test were the only fallacies among the negatives. (Apparently, this test does not give a positive reaction with an ectopic pregnancy, though Novak and Porges have done further work along this line.[2])

CONCLUSION

This test, based on the work of Novak and Porges, can be applied successfully for the early diagnosis of pregnancy. A positive test proves pregnancy with certainty, and a negative test does not exclude pregnancy, but renders it highly improbable.

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EDITORIAL DEPARTMENT

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THE CORPUS LUTEUM

From developments in the past ten years, endocrinology gives promise of becoming the most fruitful of the medical sciences. It is now about in the stage which bacteriology occupied in the last quarter of the Nineteenth Century, after Pasteur's work on diseases of beer, and anthrax in sheep; and after the discovery of the use of solid culture media and the promulgation of Koch's postulates. Following the establishment of this bacteriological technic, the causative agent of one contagious disease after another was disclosed. The cause of tuberculosis, diphtheria, cholera, typhoid fever, dysentery, glanders, gonorrhea, meningitis, syphilis, and many other bacterial diseases, was discovered.[1]

According to the postulates generally ascribed to Robert Koch, in order to prove that a given micro-organism is the cause of a particular disease it must be shown: (1) that it is always present in the diseased tissues and not in normal tissues; (2) the organism must be grown from the diseased tissue in pure culture; and (3) on inoculation into a susceptible animal it must regularly reproduce the disease.

Somewhat analogously, the postulates of endocrinology would be as follows: (1) extirpation of a given tissue of an animal must give a definite and predictable syndrome; (2) the organ extract or hormone under investigation must upon introduction into the animal's body prevent the development of that syndrome; and (3) the potency of the hormone must be capable of measurement and standardization by an objective test. Fulfillment of these requirements establishes a given tissue extract as a drug in pharmacology, before it is completely purified or separated from contaminating substances. Considerable further work is necessary to establish its place in therapeutics.

Following the fulfillment of the postulates which establish a substance as a hormone in animal experimentation, the clinician has merely been given a lead. He must then, since human and animal symptoms are not always alike, study the syndromes of hormone dysfunction in his patients. The conditions which he should hope eventually to satisfy are: (1) autopsies should show that a certain clinical syndrome is always accompanied by pathological hypertrophy of a certain tissue while another syndrome accompanies its dystrophy; (2) in life the symptoms of hypertrophy should be repaired by partial extirpation of the tissue on the one hand, or the dystrophy by substitution therapy on the other; and (3) at least one objective effect of the tissue extract in question should be measurable.

Fulfillment of the last entire group of requirements is desirable, but actually only the third, the quantitative test for its activity, is essential for clinical use. Insulin was therapeutically valuable soon after its effect in lowering the blood sugar was demonstrated. Parathyroid extract could be used soon after its effect on the blood calcium was known.

Thyroid extract, insulin, certain liver extracts, parathyroid extract, and other endocrine secretions have established a place in therapeutics. Estrin,[2] the hormone of the Graafian follicle, has fulfilled the requirements of animal experimentation: (1) after ovariectomy in animals estrus ceases; (2) in spayed animals following injections of active solutions of estrin and even of a potent crystalline extract, it recurs; and (3) the potency of the extract may be tested by determining the quantity necessary to produce a certain type of cell in the vaginal smear. The place of estrin in therapeutics is yet to be determined. It is being established slowly be-

1. Jordan, E. O.: General Bacteriology. Philadelphia: W. B. Saunders Co., 1928.

2. Ed. Estrin. S.M.J., 21:162, 1928.

cause the execution of the test which demonstrates its presence in human beings involves the keeping of laboratory animals and is troublesome to perform.

Another ovarian preparation, an extract of the corpus luteum, is just emerging into the stage of pharmacological recognition. Its physiological function has been determined. Perhaps eventually it will have a clinical field of usefulness greater than that of estrin.

The corpus luteum forms cyclically, or rhythmically, on the site of rupture of the Graafian follicle of the ovary, to be absorbed before a new follicle develops, if the ovum is not fertilized; or if the ovum is fertilized, to persist throughout the period of gestation. Implantation of the fertilized ova in the uterine wall is impossible without a functioning corpus luteum. If the ovary of a pregnant animal be removed or if the corpus luteum itself be excised, the fetus is resorbed. These facts have been known since the beginning of the century, and consequently many attempts have been made to treat with corpus luteum extracts, or dissicated ovarian preparations, the supposed symptoms of corpus luteum deficiency.[3] For years, gynecologists, obstetricians, and internists have prescribed corpus luteum preparations by mouth and by hypodermic injection, for nausea of pregnancy, dysmenorrhea, nervousness of the menopause, and so on, just as pancreatic extracts and dried pancreas were given to diabetics years before the discovery of insulin. The extracts were not drugs. They had no known specific activity. They had, perhaps, the general, slowly stimulating effects, of certain foods.

Willard Allen,[4] Corner,[5] and others, at the University of Rochester, recently have obtained a corpus luteum extract with many of the properties and effects of the original functioning "yellow body" of the ovary. It permits implantation of the fertilized ovum in the uterine walls if the ovary is removed while the ova are still in the tubes; or under certain conditions it permits the development of artificial placentas in the uterine walls.[3] It is a substance which sensitizes the endometrium, as does the normal corpus luteum.

Allen,[4] by daily injections of the extract, has been able to carry pregnant spayed rabbits to normal term, or to induce progestational proliferation of the uterine epithelium, the preparation of the uterine lining for pregnancy. He proposes for his extract the name, progestin. Hisaw[6] and his coworkers at the University of Wisconsin, have reported an extract which in proper combination with the follicular hormone, estrin, produces in castrated female monkeys a typical premenstrual epithelium.

In lower animals, estrin initiates the estrual state, and the corpus luteum prepares the uterus for reception and nutrition of the fertilized ova. Among primates, estrin and the corpus luteum in normal sequence seem to be necessary for menstruation.[7]

The new methods of extraction of the corpus luteum make the hormone expensive, and quite different methods have yielded apparently active products. The best commercial process is still to be devised. The extract has therefore not yet even reached the stage of clinical trial. It throws light upon the conceptions of ovarian physiology, and exposes the futility of much previous ovarian therapy. It is one of the most promising new developments. It is in the gerundive position of being about to be made into an important adjuvant to therapeutics.

3. Goldstein, L. A.; and Tatelbaum, A. J.: Physiology of the Corpus Luteum. Amer. Jour. Physiol., 92: 14, Dec., 1929.

4. Allen, Willard M.: Physiology of the Corpus Luteum. Preparation and some Chemical Properties of Progestin, a Hormone of the Corpus Luteum Which Produces Progestational Proliferation. Amer. Jour. Physiol., 92:174, Feb., 1930.

5. Allen, W. M.; and Corner, G. W.: Physiology of the Corpus Luteum. Proc. Soc. Exp. Biol. and Med., 27:403, Feb., 1930.

6. Hisaw, F. L.; Meyer, R. K.; and Fevold, H. L.: Production of a Premenstrual Endometrium in Castrated Monkeys by Ovarian Hormones. Proc. Soc. Exp. Biol. and Med., 27:400, Feb., 1930.

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VARIABLES IN MILK

Milk is universally accepted as the most nearly perfect food, though under many conditions of production it may be of low nutritive value. Its content of minerals and vitamins varies widely with the season and the ration of the cow. In summer, milk is richer in vitamins than when the cow is on winter feed, in such northern states as Wisconsin.

In the South an abundance of green feed should be available for dairy herds all winter, but it frequently happens that Southern dairymen for economic reasons severely reduce this part of the ration. Public health authorities usually regulate the quantity of fat in the milk for distribution, forbid watering or other adulteration of milk, and require a low bacterial content. Milk is certified if the conditions of its milking, bottling

and distribution permit a minimum of contamination. Adequate cow feed is not included as a public health requirement for production of any grade of milk, cheap or costly.

Not only is the quality of the milk affected by the quantity of green feed in the ration, but the mineral and probably other constituents of the green feeds vary with the mineral content of the soil on which they are grown. Weston[7] shows that the soil of South Carolina produces vegetables high in iodine, manganese, and iron, which he believes accounts for the low incidence of goiter in South Carolina. He reports also that a group of babies on milk from one source, without iodine or copper, and low in iron and manganese, became anemic, while babies on milk from another source comparatively rich in those elements, had a higher average hemoglobin. The physician can not feel safe about the baby's milk merely because it is clean.

Not only the soil, but the seeds planted for cow feed also must affect the milk; for certain corns are rich in vitamin A, while others grown on the same soil have none of it. Some years ago it was shown that the development of vitamin A in plants is closely associated with the development of yellow pigment. Hauge,[8] of Purdue University, planting a hybrid corn which produced yellow and white kernels on the same ear, observed that the yellow kernels contained vitamin A while the white did not. The same conditions of sun, soil, and moisture in the one case produced a product rich in vitamin A, in the other an A-deficient. Inheritance of seed quality was the determining factor.

"The human mind longs to spring up to positions of higher generality, that it may find rest there, and so after a little while wearies of experiment," says Lord Bacon.[9] But rest for the scientist is impossible.

If milk is to be a perfect food in this civilization, it must be cleanly drawn from a sturdy cow, which has eaten an abundance of green food, from a soil with the necessary mineral content, planted with seeds of high quality. These factors at least must be considered, after which one can feel sure that the half has not yet been said.

7. Weston, Wm.: Foods in the Solution of the Goiter Problem. S.M.J., this issue, p. 479.
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9. Bacon, Francis: Novum Organum. London: J. Bell & Sons, 1911.

COFFEY-HUMBER CANCER TREATMENT

The medical profession is wary of cancer cures. It has been immunized against them by frequent inoculations. Yet "Hope springs eternal," and as long as 100,000 persons per year in America die of malignant disease, publicity for any new method of treatment will arouse wide public interest. The greatest recent moment in cancer publicity was the publication by Coffey and Humber, of San Francisco, of a statement that an extract from the suprarenal cortex, a stabilizer of tissue growth, caused necrosis and sloughing of human malignant tissue. Sufferers from the disease immediately swarmed to these men. An associated press dispatch later reported that Coffey and Humber were called to Washington to report before a senate committee, where the question was to be discussed of a special appropriation from Congress to expedite their work. At the hearing before a subcommittee of the Senate Committee on Commerce,[10] a group of eminent authorities on malignant disease was called together.

The first physician to speak was Dr. W. B. Coffey, of San Francisco, who reported that he, with Dr. J. D. Humber, through a process created by them, had obtained an extract from the suprarenal cortex of sheep. A few drops of this, when injected into a patient in great pain and in the advanced stages of malignant disease, gave relief from suffering in five or six hours, and sloughing and liquefaction of the malignant growth which began in twenty-four to forty-eight hours. The necrosis of the cancerous tissue was confirmed at autopsies, and the same effects had been noted in 1,300 inoperable cases which had received injections. The patients had been treated without charge. Only those were accepted who were sent as inoperables, by physicians who had studied their cases and confirmed the diagnosis by pathological examination. Coffey and Humber did not claim to have found a cure or treatment, but were waiting for confirmation of their results by the medical profession.

The senators were impressed with the promise of the method, which had certainly a ring of honest dealing and scientific control.

Distinguished physicians long known in cancer work, Dr. Joseph Bloodgood, of Baltimore; Dr. James Ewing, of New York City, and Dr. C. C. Little, of New York, managing director of

10. Federal Aid toward Discovery of a Cure for Cancer. Hearing before a Subcommittee of the Committee on Commerce, U. S. Senate, Seventy-first Congress, Pursuant to S. Res. 79, Mar. 13, 1930.

the American Society for Control of Cancer, and also Surgeon General Hugh S. Cumming, President of the Southern Medical Association, spoke.

They confined their discussions to methods by which government assistance in cancer work might be given. The consensus of opinion seemed to be against government participation in or direction of research of private organizations at present, and in favor of support of health measures already before the senate. Dr. Bloodgood emphasized the value of the established methods of cancer treatment with radium, x-ray, and surgery. The value of government cooperation in cancer control was stressed. Dr. Ewing described activities of foreign nations in cancer control, in Sweden, England, Belgium, and Germany. In Sweden, he says, all cases are treated in one government institution in Stockholm, where patients are transported without charge if necessary. In response to leading questions, Dr. Ewing made his opinion plain that no discovery in the immediate future would offer a cure for cancer. "I see not the slightest indication at any point on the horizon of any discovery of any sort which is likely greatly to affect the mortality of that 70 per cent of patients which we now lose. . . . The people are expecting some great new discovery. . . ."

"They may be hoping," Senator Johnson, of California, interrupted.

"They are expecting," Dr. Ewing repeated. "There is no reasonable expectation of a great new discovery entering the cancer field which will greatly affect that 70 per cent of cancers, which I believe are now beyond the reach of medical science."

The opinion of one distinguished pathologist of the Coffey-Humber treatment was thus given in no uncertain terms. In spite of the immediately preceding report of liquefaction and necrosis in 1,300 inoperable cases, he considers that no great advance in cancer treatment is in sight.

A recent "Current Comment"[11] in the *Journal of the American Medical Association,* says that autopsies have now been done upon thirty patients treated by Coffey and Humber, and that both clinical and pathological results have been profoundly disappointing to "surgeons, pathologists, and other conoscenti" who have investigated the cases. The names of the investigators were not given. Though it is certain that the *Journal of the American Medical Association* would not speak thus editorially without good authority, at least a few of the names of the conoscenti should have been supplied.

The old psychological principle of fallibility of the witness is involved. The public may console itself by recalling that eventually truth always comes to light. Meantime, perhaps it will be discouraged for the present from making the long trip west.

11. Coffey-Humber Method for Cancer. Current Comment, J.A.M.A., 94:1410, May 3, 1930.

Louisville—Where We Meet

EARLY HISTORY OF LOUISVILLE*

One hundred and fifty years have passed since Louisville, the 1930 convention city of the Southern Medical Association, gained the rank of "city." Stirring and romantic episodes of history have been enacted in the metropolis of the Bluegrass State within that sesquicentenary period, but in spite of the fact that Louisville is an "old" city, as American cities count age, the time of its existence is dwarfed by a comparison with the story of the origin of the land on which it is situated.

Geology teaches us that the foundation rocks on which Louisville was built, known as the Devonian formation, were laid upon the bottom of an ancient ocean at an epoch so remote as to baffle all efforts at rational computation. Some mighty subterranean force upheaved these rocks, or more likely in this locality, the ocean seeking a lower level receded from them, leaving an elevated tableland hundreds of feet high over the present site of Louisville. Restless Nature next began to tear down the high plateau she had reared and erosion assailing it on all sides, gnawed it down to the present level. Rich are the remains of fossil life of ancient seas, uncovered by this eroding process, which have enriched the museums of the world. One man alone has gathered more than 30,000 specimens of corals and has been compelled to create one new family, seven new genera and 169 new species to enable him to describe them so that paleontologists could appreciate their individualities.

Other discoveries indicate that this section was the habitat of the Moundbuilders who antedated the Indians. Still other finds reveal the bones of the great mastodon, which wandered along what is now the Ohio River in search of food or perhaps to slake his thirst. So much for the prehistoric record of the country about Louisville. But take it all in all, the very earth on which Louisville stands, the river which flows by its sides, the prehistoric races who left their mounds and their implements on its site, the adventurers who looked upon its site when all was wild around, and the conflicts of its discoverers and its founders with the wild animal and the wilder savage of its forests, all are full of romance.

LaSalle is usually credited by historians with being the first white man to reach the Falls of the Ohio River, where Louisville is situated. With his band of

*Prepared by the Louisville Convention and Publicity League, Harry G. Evans, Secretary and Managing Director.

A view of the Falls of the Ohio River at Louisville, Kentucky, as they appeared before the construction of the hydro-electric plant which now produces sufficient electrical energy to supply Louisville and much of the surrounding country. A government canal similar in design to the Panama Canal permits the free passage of river traffic around this natural barrier to navigation. The canal serving this purpose now has been in existence a decade or more and replaced an earlier passage which served Louisville in the heyday of early river traffic.

adventurous explorers he reached this point some time in the late summer or fall of 1669. He had found a tributary of the Alleghany River and descended this and the main river and so on down the Ohio. When he reached the Falls his crew mutinied and left him alone to find his way to the Pacific or back to Canada the best way he might. But there is an interesting and plausible tradition surrounding another story of the first white person to reach the future site of Louisville, and some of the tales have a high probability of being true. There are some who contend that Moscoso, the successor of De Soto in his wanderings in the West, ascended the Ohio to the Falls and that the Spaniards who settled St. Augustine in 1565 made trips across country to the Falls. Then, there is a legendary story that the Welsh, who under Prince Madoc had come to this country in the Twelfth Century, left traditions among the Indians as well as their own skeletons and arms as proof of their presence at the Falls of the Ohio. As positive proof of this story is the large quantity of human bones found buried beneath the silt of the Ohio at Clarksville, and especially six skeletons found with brass breastpins upon them, bearing the mermaid and harp of the Welsh with the inscription, "Virtuous deeds meet their just rewards." Others going yet further back claim that Phoenicians who, according to Diodorus Siculus, navigated the wide ocean far to the West of the Pillars of Hercules, and there colonized a great island that could have been nothing but America, were in the Mississippi Valley at the Falls of the Ohio.

Between the time of LaSalle and the actual founding of Louisville many known adventurers and explorers visited this section. But Louisville really was founded when General George Rogers Clark halted at the Falls of the Ohio with his 150 raw militia, bound for the conquest of the British posts in the Illinois country, for the purpose of disciplining his forces and preparing for the campaign which resulted in giving the vast Northwest to the fledgling United States of America. On Corn Island, opposite what is now the business district of Louisville, Clark established a fort and a base of supplies. Families which he had unwillingly taken on the boats were put to good service in guarding the supplies he was leaving behind. The eighteen cabins erected in the form of a fort were their habitations and the foundation of Louisville. After the first thrusts against the British were successful, Clark made the Falls of the Ohio River his principal military headquarters for the remainder of the Revolution. Thus Louisville became the chief military outpost of the West from which Clark maintained American dominion. He spent all his later years here at the Falls of the Ohio. It is only fitting that the city which he founded should be the last resting place of this hero of the Revolution. His remains rest in beautiful Cave Hill, within the confines of Louisville, a cemetery with a botanical-garden-like scope in its architecture, and a point well worth visiting in the convention city.

Side by side with its modern industrial greatness Louisville has preserved the charm of the traditions attaching to its founding. Louisville says of itself that it is not the "biggest" town, yet in comparison with larger cities it has more to offer. It is not the "oldest" town, yet the march of progress has not erased all of those landmarks which prove its antiquity. It is not the "richest" town, but it has a reputation for knowing little of the pinch of want among its inhabitants. Louisville does boast one superlative, though; it claims that it is the "friendliest" town.

As an industrial center Louisville ranks high among the list of cities its size. Visitors attending the Southern Medical Association Convention will be welcome to visit its industrial plants. The city has nineteen plants which are the largest of their kind in the world, six others which are the largest in the United States, and sixteen others which are the largest south of the Ohio River. Dolls, agricultural implements, hardware, baseball bats, pigments, pipe organs, stoves, glass, hydrogen, books for the blind, soap, steam pumps cigarettes, cigars, flour are among the products of the industrial plants of Louisville most often inspected by visitors.

So closely has the Falls of the Ohio been allied with the history of Louisville's founding, that it is interesting to note that the Falls still play a big part in the life of the city. A great power plant has been built to take advantage of the natural resource provided by the difference in water level above and below the barrier

which once formed the Falls. Now through this hydro-electric plant the City of Louisville and a great portion of the surrounding country is supplied with electric power. The plant is so constructed that it is possible to produce 135,000 horsepower.

The Convention Committee preparing for the Southern Medical Association is busy arranging what it hopes will be one of the most successful and enjoyable meetings ever experienced. Nothing is being left undone which would add to the pleasure of the visit to Kentucky. Side trips to the interesting places in the State are being arranged, while every opportunity will be taken to use the wealth of entertainment facilities possessed by Louisville.

Book Reviews

Research and Medical Progress and Other Addresses. By J. Shelton Horsley, M.D., Attending Surgeon, St. Elizabeth's Hospital, Richmond, Va. 208 pages. St. Louis: The C. V. Mosby Company, 1929. Cloth, $2.00.

This small volume comprises a wide variety of subjects. The essay from which the book takes its name was the author's presidential address before the Southern Medical Association in 1927. The JOURNAL calls attention with particular pride to this fact, which makes the volume of more than customary interest to Southern readers. The author is a surgeon of wide reputation as an operator, as an investigator who has carried on research in surgical problems away from any teaching center, and as a surgical philosopher as well.

The essays deal not with the technical details of surgical procedures, but with ethical, historical, and other general matters of medical interest as well, as the titles would indicate. The subjects treated are physiology and physiologic research in surgery, subjects which have been enlightened by the rapid advances in physiology of the Twentieth Century; the career and ideals of the surgeon; such personal problems as that of whether the surgeon should tell the truth to a patient suffering with an incurable condition, for example, with cancer. There are essays upon more particular phases of stomach surgery; upon treatment of cancer; upon politics and medicine; and upon the medical profession of Virginia and state medicine.

While the addresses are of particular interest to physicians, they have a broader cultural appeal which will attract the well informed layman as well. They are the expression of an experienced surgeon who has read widely in non-surgical as well as surgical literature.

A Text-Book on Orthopedic Surgery. By Willis C. Campbell, M.D., F.A.C.S., Professor of Orthopedic Surgery, University of Tennessee, College of Medicine, Memphis; Attending Orthopedic Surgeon, Baptist Memorial Hospital, Methodist Hospital, St. Joseph's Hospital, Home for Incurables, Porter Home and Leath Orphanage; Chief of Staff, Crippled Children's Hospital and Hospital for Crippled Adults, Memphis. Octavo volume of 705 pages, with 507 illustrations. Philadelphia and London: W. B. Saunders Company, 1930. Cloth, $8.50.

Dr. Campbell's orthopedic text is excellent in every respect, but its particular value and its greatest importance as an addition to orthopedic literature are to be found in those chapters which are devoted to traumatic and infectious conditions. The centering of the author's interest in these subjects is denoted by the proportioning of the book, in which only the last one hundred pages are devoted to classical juvenile orthopedics, whereas the sections concerning acute and chronic affections of joints, ankylosis, traumatic arthritis, dislocations, fractures, and soft tissue inflammations and injuries constitute the greatest mass and the most distinctly valuable part of the book. The author's immense experience in this field of orthopedics has very evidently been the source of material for these chapters, for a great deal that is distinctly original is noted in the discussion of the various subjects herein included. Careful description, and wealth of detail with excellent indexing, make the book invaluable for reference, while its devotion to subjects of everyday interest make of it an ideal complement to the more classical contemporary texts.

The Principles of Bacteriology and Immunity. By W. W. C. Topley, M.A., M.D., M.Sc., F.R.C.P., Professor of Bacteriology and Immunology, University of London; Director of the Division of Bacteriology and Immunology, London School of Hygiene and Tropical Medicine, and G. S. Wilson, M.D., M.R.C.P., D. P.H., Reader in Bacteriology and Immunology in the University of London, London School of Hygiene and Tropical Medicine. Volumes I and II. New York: William Wood & Co., 1930. Price, both volumes, $15.00.

The usual English text-book on bacteriology, say Topley and Wilson, is from an anthropocentric standpoint, which has a sterilizing effect upon science. There is need of a liaison between research workers in human and veterinary medicine. Many of the known bacterial species have been studied almost wholly from the point of view of the pathologist.

Following this introduction, one expects a text-book which differs greatly in arrangement and emphasis from the average. This does not seem to be markedly different, however, from other works on the same subject, nor to offer a strikingly new point of view. The chapter on the history of the subject gives the usual material. The chapter on morphology of bacterial forms shows some unstained dark ground, ultraviolet photographed specimens of bacteria, illustrating nuclear structure. These are interesting. The viewpoint in all subjects is judicial and conservative, for instance, in the controversies as to sexual reproduction of bacteria, and as to the phenomenon of bacteriophagy.

The second volume deals extensively with immunity, anaphylaxis, and hypersensitivity very fully and in detail. In this volume, discussions of specific disease producing bacteria are given with the pathological manifestations which accompany their growth in living animals. The usual infectious diseases are discussed. There are also chapters upon glanders and meloidosis, swine erysipelas, and several other diseases of animals.

The connection between contagious abortion in cattle and human undulant fever is mentioned rather briefly.

The authors have an abundant acquaintance with American as well as English and continental literature. The book is a very good, reliable and up-to-date compilation of a vast material. The print is unfortunately a little small.

Medical Insurance Examination: Modern Methods and Rating of Lives. By J. Paterson MacLaren, M.A. (Double Honours Scott Scholar), B.Sc., M.B., C.M., and J.P. (Glasgow University and London Hospitals), Late Examiner for University of Cape of Good Hope and Chief Insurance Medical Officer. Second Edition, Greatly Enlarged. 646 pages. New York: William Wood and Company, 1930. Cloth, $10.00.

There have been two editions of this book in two years. It was written to show physicians the importance of the data collected in making life insurance examinations, and the manner in which it is evaluated by the chief examiner in rating the applicant. The subject is covered in great detail. The section on "Physical Examination" includes examination of lungs, heart, pulse, abdomen, pelvis, and urine; also the use of the sphygmomanometer and interpretation of blood pressure readings. Complete tables of weights and heights are added. The importance of deviations from the normal is shown; the increase of risk and manner of applying ratings is clearly given, and the facts deduced are substantiated by data of such size that they are conclusive. In the section on "Diseases as Insurance-Impairments" the author discusses in detail the impairment from build and senesence, lung affections, diseases of the heart and blood vessels, high and low blood pressure, alcoholism, gout, and apoplexy, goitres, albuminuria, diabetes, syphilis, tropical diseases and parasites, diseases of the abdomen, pelvic conditions, diseases of mouth, ear, nose, and eye; diseases of bones and joints; tumors, benign and malignant; occupational mortality, and the rating of a risk.

An appendix gives the confidential report as properly executed and comments on the importance of specific statements. An extensive bibliography is added.

This book is to be highly commended for most of its deductions. The author appears to be too enthusiastic as to the importance of Frost's cardio-respiratory test in prognosis.

Diseases Transmitted from Animals to Man. By Thos. G. Hull, Chief Bacteriologist, Illinois Department of Public Health; Assistant Professor of Pathology and Bacteriology, University of Illinois, College of Medicine. With an introduction by Veranus A. Moore, Director, New York State Veterinary College, Cornell University. 350 pages with 29 illustrations and 43 tables. Springfield, Illinois: Charles C. Thomas, Publisher. Cloth, $5.50.

Most of the known diseases specifically spread by animals are herein discussed. Those which regularly infest animals are considered, and those which are only occasionally transmitted by them. Emphasis is put upon diseases found in the United States. Such conditions as sleeping sickness, or malaria, which are specifically transmitted through insects, are omitted.

The maps showing the extent of different diseases in the United States are particularly valuable, with the history of the various epidemics in the United States and their places of origin. The studies of the origin of septic sore throat and scarlet fever from infected milk supplies in cities and villages will interest public health workers.

On this phase of bacteriology few books have been written. The work contains much good material, well arranged.

The Normal Diet: A Simple Statement of the Fundamental Principles of Diet for the Mutual Use of Physicians and Patients. By W. D. Sansum, M.S., M.D., F.A.C.P., Director of the Potter Metabolic Clinic, Department of Metabolism, Santa Barbara Cottage Hospital, Santa Barbara, California. Third Revised Edition. 134 pages. St. Louis: The C. V. Mosby Co., 1930. Cloth, $1.50.

"The Normal Diet" expresses the usual views upon the subject, perhaps a little more briefly and clearly than the average work on the subject. The author's claim that high blood pressure was reduced in 90 per cent of his cases by feeding the patients a diet with an alkaline ash would be questioned in most quarters. The volume may be commended for its handling of the subject in small space. It is for popular use.

The Diagnosis and Treatment of Diseases of the Blood. By Thomas Ordway, M.D., Dean and Associate Professor of Medicine, Albany Medical College, and Physician-in-Chief, Albany Hospital, Albany, N. Y., and L. Whittington Gorham, M.D., Clinical Professor of Medicine, Albany Medical College, and Associate Physician, Albany Hospital, Albany, N. Y. Volume IX of Oxford Monographs on Diagnosis and Treatment, edited by Henry A. Christian, M.D., Sc.D., LL.D., Hersey Professor of the Theory and Practice of Physic, Harvard University, and Physician-in-Chief, Peter Bent Brigham Hospital, Boston, Mass. 605 pages, illustrated. New York: Oxford University Press, 1930.

The authors have given a very clear description of diseases of the blood and each section shows extensive study as well as their personal experience. The reader is given both sides of controversial questions, the authors always indicating their preference and their reasons for it.

The descriptions are full and up to date. It is hoped that when additions are made to this book the authors will devote a section to technical methods of blood examination. In a monograph one should not have to go to other books to acquire knowledge of methods of procedure.

No review of this text would be complete without special mention of the chapter devoted to "Anemias of Childhood," by Professor Kenneth D. Blackfan, of the Pediatrics Department of Harvard University, and his associates, Drs. James M. Baty and Louis K. Diamond. The illustrations are original and very well executed.

Hemorrhoids, Their Etiology, Prophylaxis and Treatment by Means of Injections. By Arthur S. Morley, F. R. C. S., Eng., Late Temporary Assistant Surgeon to St. Mark's Hospital for Cancer, Fistula, and Other Diseases of the Rectum. 122 pages. Fourth impression, revised and enlarged. New York: Oxford University Press, 1929. Cloth, $2.00.

This little book, the first monograph written on this subject, gives a systematic review of injection treatment of hemorrhoids by an author who has had extensive practical experience.

A chapter on "An Improved Technic" has been added in the back of this edition, which makes two distinct chapters in different parts of the book on technic. In spite of this disarrangement of subject matter, it is an excellent book on this subject.

Hemorrhoids, the Injection Treatment and Pruritis Ani. By Lawrence Goldbacher, M.D., Philadelphia. Illustrated with 31 half-tone and line engravings, some in colors. Philadelphia: F. A. Davis Company, 1930.

This little book is divided into four parts. The first gives general consideration to surgical anatomy, classifications and etiology (taken from Piersol's "Human Anatomy") of hemorrhoids.

Part two discusses the classification of internal hemorrhoids, microscopical pathology as described by Pennington, symptoms, diagnosis, author's anoscope, prognosis and oil injection method of treatment.

A surprising statement is: "Numerous formulae have been advocated, of which the writer finds only one of value, namely, 5 per cent phenol in Wesson or cottonseed oil." This opinion is not in accord with other workers who have had experience with this and other valuable formulae.

Part four is devoted to discussion of treatment of pruritis ani without the demonstrable cause.

The rationale of treatment is based upon the conviction that sub-tegumentary perianal tissue spaces and channels bearing irritating products exist and account for many cases of pruritis ani. A method of obliterating these spaces by perianal and submucous injections of a 5 per cent solution of phenol crystals dissolved in cottonseed oil is described. The conclusions are drawn from 17 cases. All are reported improved, and four are cured.

The physical appearance and arrangement of subject matter are excellent, the illustrations well selected.

Dr. Colwell's Daily Log for Physicians. 1930 Edition. Champaign, Illinois: Colwell Publishing Company.

A loose leaf log 8½ by 10 inches, bound in stiff cover with full sheets for each day's work, with monthly summary and income tax records.

It is a complete business record for physicians and an ideal acquisition for any one who wishes to improve his bookkeeping.

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Demonstrations of the Physical Signs of Clinical Surgery. By Hamilton Bailey, F.R.C.S. (Eng.), Surgeon Dudley Road Hospital, Birmingham. Second edition, revised and enlarged with 306 illustrations, some of which are in color. 268 pages. New York: William Wood, 1930. Cloth, $6.50.

This is replete with illustrations that a brief and concise text explains. The author starts with a short summary of basic physical signs and rapidly plunges into a demonstration of pathology. It will be easily understood by the fourth year student, for whom it has been written, and will be refreshing for the older man.

The Baby's First Two Years. By Richard M. Smith, A.B., M.D., Sc.D., Assistant Professor of Child Hygiene, Harvard Medical School and School of Public Health. 159 pages with illustrations. New and Revised Edition. Boston and New York: Houghton Mifflin Company, 1930. Cloth, $1.75.

The instructions will be useful to young mothers, and are not at all difficult to understand.

Normal Facts in Diagnosis. By M. Coleman Harris, M.D., Lecturer on Physical Diagnosis, New York Homeopathic Medical College and Flower Hospital, New York City, and Benjamin Finesilver, M.D., Lecturer on Diseases of the Nervous System, New York Homeopathic Medical College and Flower Hospital. 247 pages, illustrated with 42 engravings, some in colors. Philadelphia: F. A. Davis Company, 1930. Cloth, $2.50.

The book concerns itself with only the normal facts in diagnosis. Pathology is reduced to a minimum. In addition, the book presents a brief, ready reference of those diagnostic signs which easily slip the mind, especially of the practitioner who is not using them daily.

Southern Medical News

ALABAMA

Dr. W. G. Harrison, Birmingham, was elected President of the Alabama State Medical Association at the annual meeting held in Montgomery in April.

Dr. J. N. Baker, Montgomery, was elected State Health Officer of Alabama, at the annual meeting of the State Medical Association in April.

Deaths

Dr. Benjamin Franklin Darnell, Fitzpatrick, aged 96, died March 2, of pneumonia.

Dr. William Mastin Green, Valley Head, aged 75, died in February.

Dr. Jacob David Staples, Talladega Springs, aged 43, died February 19, at Goodwater.

ARKANSAS

Columbia County Medical Society has elected Dr. C. T. McWilliams, Magnolia, President; Dr. E. T. Hudnall, Taylor, Vice-President; Dr. W. H. Horn, Taylor, Secretary-Treasurer.

Lincoln County Medical Society has elected Dr. G. W. Ringgold, Gould, President; Dr. C. W. Dixon, Gould, Vice-President; Dr. A. C. Thiolliere, Gould, Secretary.

Woodruff County Medical Society has elected Dr. J. H. West, Grays, President; Dr. R. L. Frazer, McCrory, Vice-President; Dr. L. E. Biles, Secretary-Treasurer.

The annual meeting of the Arkansas Tuberculosis Association was held at Little Rock, May 5th and 6th.

The First Councilor District and Northeast Arkansas Medical Society held a meeting at Blytheville on April 8. The officers are: Dr. A. G. Henderson, Jonesboro, President; Dr. F. D. Smith, Blytheville, Vice-President; Dr. W. W. Verser, Harrisburg, Councilor; Dr. W. M. Majors, Paragould, Secretary and Treasurer.

Dr. Morgan Smith, Little Rock, has been elected member of the Pulaski County Board of Education.

Dr. L. D. Duncan, Waldron, has been elected President of the State Board of Health and Dr. R. M. Eubanks, Little Rock, Vice-President.

Dr. W. M. Branch, of Lead Hill, is now located at Springdale.

Dr. W. E. Jones, of Morrilton, has moved to Seminole, Oklahoma.

Dr. A. G. Emerson, of Edinburg, has moved to Bradford.

Deaths

Dr. St. Cloud Cooper, Fort Smith, aged 68, died March 29, of heart disease.

Dr. George K. Mason, Little Rock, aged 72, died March 14, of heart disease.

Dr. Edward Meek, Little Rock, aged 77, died April 10.

Dr. Lewis C. Smith, Bonanzo, aged 71, died February 28, of heart disease.

DISTRICT OF COLUMBIA

The International Congress on Mental Hygiene met in Washington May 5th to 10th, under the presidency of Dr. William A. White of that City.

Lieut. Col. F. H. Garrison, Medical Corps, U. S. Army, was retired May 1 and then became librarian of the Welch Medical Library of the Johns Hopkins Medical School. Dr. Garrison was Assistant Librarian in the Surgeon General's Office, at Washington, from 1889 to 1922.

Surgeon General Hugh S. Cumming of the United States Public Health Service, says Washington is the only large city in the world which is not provided with a sanatorium to care for tuberculous children. A committee under the auspices of the Washington Tuberculosis Association has been appointed to call the attention of the public to the need for a hospital for tuberculous children.

Deaths

Dr. John B. Baggett, Washington, aged 85, died March 14, of arteriosclerosis, chronic nephritis and uremia.

Dr. Wilford Mason Barton, Washington, aged 58, died April 3, of peritonitis, following an operation.

Dr. Lyman Dow, Washington, aged 86, died December 29, 1929, of myocarditis and bronchopneumonia.

Dr. Raymond Adams Fisher, Washington, aged 47, died March 17, of arteriosclerosis, nephritis and cerebral hemorrhage.

Dr. Keene Richards Forston, Washington, aged 62, died March 24, of injuries received when struck by an automobile.

Dr. Hugh McKee Grant, Washington, aged 63, died in March of myocarditis.

FLORIDA

Dr. Edward Jelks, Jacksonville, has been appointed Councilor of the Southern Medical Association from Florida, the appointment having been made recently by the President of the Association, Dr. Hugh S. Cumming, Washington, D. C. Dr. Jelks succeeds Dr. H. Marshall Taylor, Jacksonville, whose term had expired and who having served the maximum time permitted under the Constitution was not eligible for reappointment.

Brevard County Medical Society has elected for its 1930 officers Dr. W. C. Page, Cocoa, President; Dr. C. B. White, Cocoa, Vice-President; Dr. I. K. Hicks, Melbourne, Secretary and Treasurer.

Dr. E. G. Peek, Ocala, has been elected on the State Democratic Committee and as a member of Governor Carlton's Tax Adjustment Board.

Dr. J. N. Moore, Ocala, is in New York City doing post-graduate work in x-ray and radium.

Deaths

Dr. James D. Love, Jacksonville, aged 57, died March 26, following a three-day attack of pneumonia.

Dr. Frederick Jay Bowen, Jacksonville, aged 53, died suddenly March 22, of heart disease.

Dr. William H. Beaty, Lake Worth, aged 77, died March 10.

Dr. Walter Philip Dickinson, Lakeland, aged 50, died February 7, at Oteen, North Carolina, of tuberculosis.

Dr. William Rowan Groover, Lakeland, aged 62, died suddenly March 8, of coronary thrombosis.

Dr. Cicero W. Love, Lakeland, aged 54, died February 5, of coronary thrombosis.

Dr. Olin Glaze McKenzie, Miami, aged 36, died March 8, of cardiorenal disease.

Dr. William A. J. Pollock, Pensacola, aged 59, died March 5, of heart disease.

GEORGIA

Blue Ridge Medical Society has elected Dr. J. M. Daves, Blue Ridge, President; Dr. E. L. Prince, Morganton, Vice-President; Dr. C. B. Crawford, Blue Ridge, Secretary-Treasurer.

Bibb County Medical Society has elected Dr. J. D. Applewhite, Macon, President; Dr. J. Fred Adams, Macon, Vice-President; Dr. R. C. Goolsby, Jr., Macon, Secretary-Treasurer.

Brooks County Medical Society has elected Dr. E. J. Jelks, Quitman, President; Dr. R. E. McClure, Quitman, Secretary-Treasurer.

Bulloch-Candler-Evans Medical Society has elected Dr. W. D. Kennedy, Metter, President; Dr. W. D. Woods, Portal, Vice-President; Dr. W. E. Simmons, Metter, Secretary-Treasurer.

Campbell County Medical Society has elected Dr. W. R. Camp, Fairburn, President; Dr. T. P. Bullard, Palmetto, Vice-President; Dr. A. J. Green, Union City, Secretary-Treasurer.

Clarke County Medical Society has elected Dr. John A. Hunnicutt, Jr., Athens, President; Dr. W. H. Cabaniss, Athens, Vice-President; Dr. M. A. Hubert, Athens, Secretary-Treasurer.

Cherokee County Medical Society has elected Dr. John P. Turk, Nelson, President; Dr. Wm. O. Rhodes, Holly Springs, Vice-President; Dr. George C. Brooke, Canton, Secretary-Treasurer.

Coffee County Medical Society has elected Dr. D. H. Meeks, Nicholls, President; Dr. L. H. Shellhouse, Willachoochee, Vice-President; Dr. W. L. Hall, Nicholls, Secretary-Treasurer.

Dooly County Medical Society has elected Dr. R. H. Pate, Unadilla, President; Dr. W. N. Edenfield, Vienna, Vice-President; Dr. F. E. Williams, Vienna, Secretary-Treasurer.

Elbert County Medical Society has elected Dr. A. C. Smith, Elberton, President; Dr. G. A. Ward, Elberton, Vice-President; Dr. B. B. Mattox, Elberton, Secretary-Treasurer.

(Continued on page 34)

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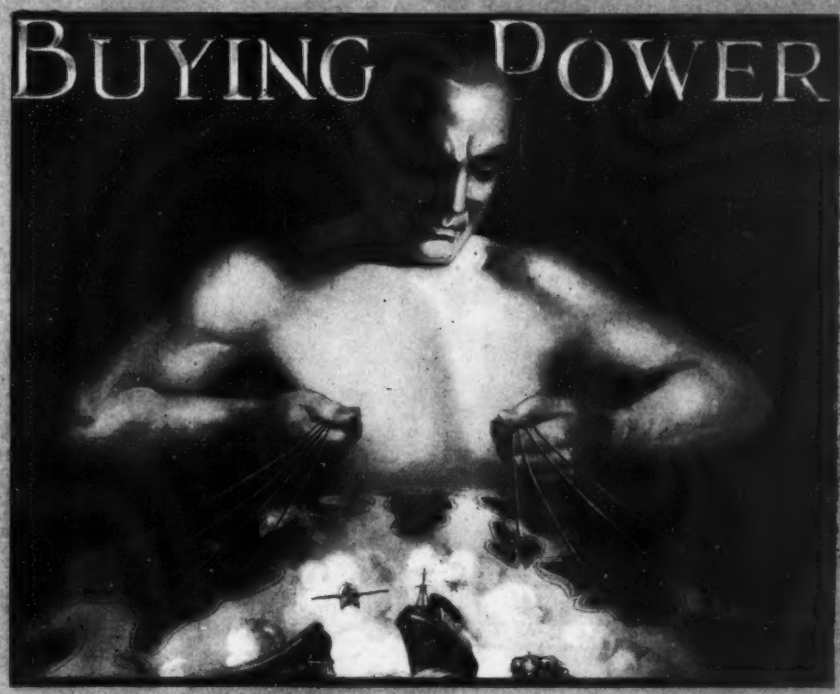

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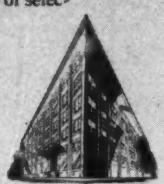

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(Continued from page 570)

Emanuel County Medical Society has elected Dr. A. C. Johnson, Garfield, President; Dr. R. L. Sample, Summit, Vice-President; Dr. R. C. Franklin, Swainsboro, Secretary-Treasurer.

Gordon County Medical Society has elected Dr. B. W. Fite, Resaca, President; Dr. W. R. Barnett, Calhoun, Vice-President; Dr. W. R. Richards, Calhoun, Secretary-Treasurer.

Grady County Medical Society has elected Dr. Eugene Clower, Cairo, President; Dr. W. R. Moore, Cairo, Vice-President; Dr. J. V. Rogers, Cairo, Secretary-Treasurer.

Jackson County Medical Society has elected Dr. H. E. Crow, Talmo, President; Dr. F. M. Hubbard, Commerce, Vice-President; Dr. J. C. Bennett, Jefferson, Secretary-Treasurer.

Morgan County Medical Society has elected Dr. D. M. Carter, Madison, President; Dr. W. M. Fambrough, Botswick, Vice-President; Dr. W. C. McGeary, Madison, Secretary-Treasurer.

Monroe County Medical Society has elected Dr. G. H. Alexander, Forsyth, President; Dr. R. C. Goolsby, Forsyth, Vice-President; Dr. J. O. Elrod, Forsyth, Secretary-Treasurer.

Muscogee County Medical Society has elected Dr. C. Amory Dexter, Columbus, President; Dr. Francis B. Blackmar, Columbus, Vice-President; Dr. Hugh J. Bickerstaff, Columbus, Secretary-Treasurer.

Spalding County Medical Society has elected Dr. W. H. Austin, Griffin, President; Dr. A. H. Huckaby, Griffin, Vice-President; Dr. H. J. Copeland, Griffin, Secretary-Treasurer.

Sumter County Medical Society has elected Dr. J. W. Chambliss, Americus, President; Dr. J. C. Logan, Plains, Vice-President; Dr. H. M. Tolleson, Smithville, Secretary-Treasurer.

Taylor County Medical Society has elected Dr. W. W. Edwards, Butler, President; Dr. S. H. Bryan, Reynolds, Vice-President; Dr. R. C. Montgomery, Butler, Secretary-Treasurer.

Troup County Medical Society has elected Dr. Enoch Callaway, LaGrange, President; Dr. S. C. Rutland, LaGrange, Vice-President; Dr. Hugh McCulloch, Jr., West Point, Secretary-Treasurer.

Turner County Medical Society has elected Dr. H. M. Belflower, Sycamore, President; Dr. W. J. Turner, Ashburn, Vice-President; Dr. J. H. Baxter, Ashburn, Secretary-Treasurer.

Warren County Medical Society has elected Dr. H. T. Kennedy, Warrenton, President; Dr. F. L. Ware, Warrenton, Vice-President; Dr. H. B. Cason, Jr., Warrenton, Secretary-Treasurer.

Wilkes County Medical Society has elected Dr. L. M. Ellis, Washington, President; Dr. H. M. Sale, Rayle, Vice-President; Dr. H. T. Harriss, Washington, Secretary-Treasurer.

The Chattahoochee Valley Medical and Surgical Association will meet in Albany, July 8-9.

Examinations of the State Board of Medical Examiners will be held in Augusta, June 4, 5 and 6, and in Atlanta, June 11, 12 and 13.

A post-graduate course in general medicine and obstetrics will be given for the colored physicians of Georgia by Emory University in cooperation with the State Board of Health and the Children's Bureau, Department of Labor, Washington, D. C. This school will be held at the colored section of Grady Hospital, June 16-20.

There has been subscribed to the Contennial Memorial Building Fund of the Medical Department of the University of Georgia, Augusta, more than a quarter of a million dollars for the erection of a building to commemorate the one hundredth anniversary of the founding of the Medical School by Dr. Milton Antony in 1823. To reach the goal for the fund an amount of $40,000 is still needed.

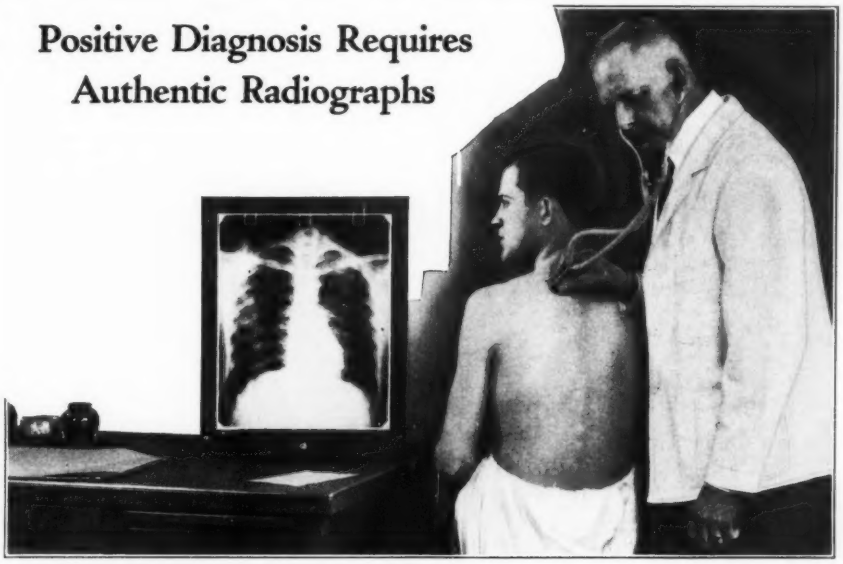
The Doctors Building in Atlanta was destroyed by fire, April 6. The loss was estimated at approximately $750,000.

Ware County Medical Society members recently voted to approve a bond issue for Ware County for the sum of $150,000 to build and equip a hospital with one hundred bed capacity.

Drs. L. C. and M. B. Allen, Hoschton, have opened

(Continued on page 36)

Positive Diagnosis Requires Authentic Radiographs



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Louisville, Kentucky

(Continued from page 34)

a hospital in connection with their clinic in a new two-story building. They have associated with them Dr. H. H. Lancaster and Dr. Loyd Lott.

Dr. O. H. Cheek, Dublin, recently entertained the physicians attending the Malaria Conference in that City at a fish luncheon.

Dr. W. P. Kirkland, of Pearson, has located at Manchester and will have Dr. J. A. Johnson associated with him in general practice.

Dr. Grady E. Clay, Atlanta, after an absence of some months on account of health, announces the resumption of practice with offices in the Medical Arts Building, practice limited to ophthalmology.

Dr. Asa Beach, Atlanta, has moved to Thomaston and is in charge of the new City Hospital there.

It has been reported that a new building will be built shortly in Atlanta exclusively for physicians and dentists.

Dr. C. M. Sharp, formerly of Atlanta, is now Medical Director of a private hospital at Saranac Lake, New York.

Deaths

Dr. Henry Dawson Allen, Milledgeville, aged 74, died March 22, of cerebral hemorrhage.

Dr. Walter M. Burckhalter, Comer, aged 60, died March 18.

Dr. Elijah L. Connally, Atlanta, aged 92, died March 16, of heart disease.

Dr. J. M. Head, Zebulon, aged 77, died April 9.

Dr. Wm. Henry Johnson, Atlanta, aged 56, died March 24 after an illness extending over a period of eight months.

Dr. Robert T. Laseter, Gibson, aged 71, died January 25.

Dr. William D. Roper, Atlanta, aged 62, died March 16, of pneumonia.

KENTUCKY

Dr. John H. Blackburn, Bowling Green, has been reappointed Councilor of the Southern Medical Association from Kentucky, the appointment having been made recently by the President of the Association, Dr. Hugh S. Cumming, Washington, D. C.

The Governor appointed, and the Senate confirmed, the following members of the State Board of Health: Dr. E. Murphy Howard, Jr., Harlan, President; Dr. George S. Coon, Louisville; Dr. Benjamin B. Keys, Murray; Carl J. Johnson, D. O., Louisville; Dr. J. Watts Stovall, Grayson; Dr. Frank L. Johnson, Livermore; Mr. Addison Dimmittee, Louisville; Dr. Lawrence T. Minish, Frankfort: and Dr. Arthur T. McCormack, Louisville, Secretary.

Deaths

Dr. Joseph Clarence Freeland, Paducah, aged 53, died April 2, of heart disease.

Dr. Frank P. Garrard, Boyd, aged 70, died in February of cerebral hemorrhage.

Dr. Samuel Richard Harover, Maysville, aged 62, died in March, of cerebral hemorrhage.

Dr. William Mason, Stamping Ground, aged 51, died March 20, of heart disease.

Dr. Edward N. Simpson, Covington, aged 71, died February 28, of myocarditis.

Dr. Louise B. Trigg, Bowling Green, aged 60, died March 20.

LOUISIANA

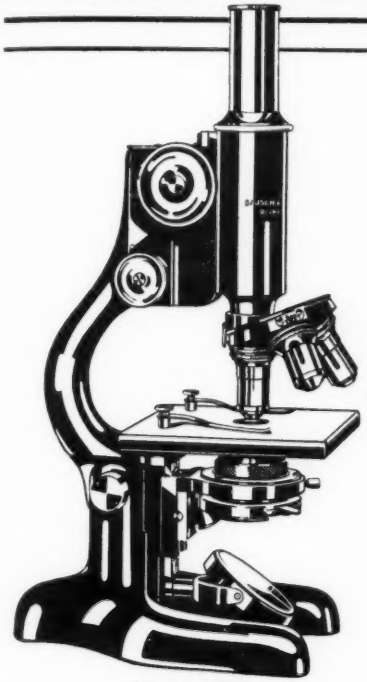
Acadia Parish Medical Society elected Dr. A. R. Morgan, Crowley, President; Dr. L. L. Kahn, Rayne, Vice-President; Dr. S. C. Henry, Crowley, Secretary-Treasurer.

Bossier Parish Medical Society elected Dr. J. B. Hall, Alden Bridge, President; Dr. C. M. Tucker, Haughton, Secretary-Treasurer.

Dr. H. W. E. Walther, New Orleans, recently addressed the Tri-State Medical Association at Marshall, Texas.

Dr. Guy R. Jones, formerly House Surgeon at Hotel

(Continued on page 38)



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(Continued from page 36)

Dieu, New Orleans, has accepted a position as Assistant to Dr. D. E. Martin of the Martin Sanatorium, Picayune, Mississippi.

Deaths

Dr. David George Lemkewitz, Cut Off, aged 46, died February 22, in New Orleans.

Dr. Manasseh L. Hoffpauer, Crowley, aged 58, died March 6.

Dr. Sara Tew Mayo, New Orleans, aged 60, died March 7, of angina pectoris.

MARYLAND

The American College of Physicians will hold its fifteenth annual clinical session at Baltimore, March 23-27, 1931, at the Lord Baltimore Hotel. Dr. Sydney R. Miller, Baltimore, is President and Mr. E. R. Loveland, Philadelphia, Pennsylvania, is Executive Secretary.

Dr. William Henry Welch, Professor of History of Medicine, Johns Hopkins University School of Medicine, Baltimore, was honored on his eightieth birthday, April 8, by a celebration which took place in Baltimore, Cincinnati, New Haven, New York and Washington as well as London, Paris and many other foreign cities.

Dr. Howard A. Kelly, Emeritus Professor of Gynecology, Johns Hopkins, Baltimore, recently presented a collection of five hundred books relating to the advancement of women in all fields, to the Welch Medical Library of Johns Hopkins University.

The Johns Hopkins Hospital, Baltimore, is in immediate need of an increase in its endowment of at least $3,000,000 in order that the institution may not have to curtail its work or face gradual depletion of its existing endowment, according to a statement by Dr. Winford H. Smith, of the Board of Trustees. The demand for and cost of modern hospital service has made this greater endowment necessary, forty-three per cent of the patients being given treatment entirely free.

Dr. William S. Love, Jr., and Mrs. Alexander K. Barton, both of Baltimore, were married April 10.

Dr. Charles V. Taylor and Miss Katherine L. Roeth, both of Baltimore, were married March 22.

Dr. Louis T. Lavy and Miss Bell Rubenstein, both of Baltimore, were married March 3.

Deaths

Dr. Ralph S. Porter, Baltimore, aged 54, died March 21, at Washington, D. C.

Dr. Anthony M. Ray, Boyds, aged 62, died March 14, of heart disease.

Dr. Henry Harry Weinberger, Baltimore, aged 43, died March 28, of pneumonia.

MISSISSIPPI

Clarksdale and Six Counties Medical Society held its fifty-sixth semi-annual session at Clarksdale, March 26. The officers are: Dr. L. B. Austin, Rosedale, President; Dr. S. H. Brevard, Deeson (Bolivar County), Vice-President; Dr. A. W. Rhyne, Coahoma (Coahoma County), Vice-President; Dr. J. L. Harris, Swan Lake (Tallahatchie County), Vice-President; Dr. W. W. Nobles, Tunica (Tunica County), Vice-President; Dr. D. V. Galloway, Clarksdale, Secretary and Treasurer.

Deaths

Dr. Olyn Floyd Parkes, Louisville, aged 34, died March 6 at Memphis, Tennessee, of pneumonia.

Dr. James Burnes Magee, Cleveland, aged 66, died suddenly in February, of heart disease.

MISSOURI

Christian County Medical Society has elected Dr. J. H. Wade, Ozark, President; Dr. H. J. Wise, Sparta, Vice-President; Dr. F. H. Brown, Billings, Secretary-Treasurer.

Schuyler County Medical Society has elected Dr.

(Continued on page 40)

The Great *Survivor*

COD LIVER OIL may well be termed "The Great Survivor." Its therapeutic efficiency was recognized even before we knew that this was due to the vitamins A and D.

Although there has been much research work done on new products, scientific opinion agrees that there is no substitute for cod liver oil. Other vitamin preparations are all right, up to a point, but cod liver oil goes one step further. It is a combination of a highly digestible fat and both vitamins A and D. It is a nutrient that has high energy value, stimulates bone and tissue formation, and is one of the most valuable protective agents available.

We are still making cod liver oil "the Patch way" up in New England. Fresh cod liver oil made at the source of supply from fresh cod livers by a process which guards against rancidity, prevents oxidation, preserves the vitamin potency and insures maximum palatability—that is Patch's Flavored Cod Liver Oil.

We would like to send you a bottle of this unusual product for personal examination and clinical test. The coupon brings it.

PATCH'S
Flavored Cod Liver Oil

The E. L. PATCH COMPANY

Boston, Mass.

THE E. L. PATCH CO.,
Stoneham 80, Dept. SM.6,
Boston, Mass.
Gentlemen: Please send me a sample of Patch's Flavored Cod Liver Oil and literature.

Dr. .....

Address .....

.....

(Continued from page 38)

Ida M. Nulton, Lancaster, President; Dr. J. H. Keller, Lancaster, Vice-President; Dr. J. B. Bridges, Downing, Secretary-Treasurer.

Dr. Evarts A. Graham, St. Louis, Professor of Surgery, Washington University School of Medicine, will give a series of six lectures at the University of Melbourne during the latter part of July on chest surgery and conditions of the gall-bladder. He and his family will return to the States in September.

Dr. M. G. Seelig, St. Louis, Professor of Clinical Surgery at Washington University School of Medicine, went to California early in April, having been appointed as one of a committee representing the American College of Surgeons, to observe the Coffey-Humber anti-cancer treatment.

Dr. Arthur W. Westrup, Webster Groves, Superintendent of the St. Louis County Hospital at Clayton has appointed the staff of the institution, the St. Louis County Medical Society cooperating.

Dr. Curtis H. Lohr, Hospital Commissioner, St. Louis, has announced that the City Sanitarium, an institution for mental diseases, is large enough to take care of only 2,036 patients and there are now 3,260 in the institution. About 250 patients, those who have no friends or relatives in St. Louis, will be transferred to the state institutions.

The Professional Building, of Kansas City, a sixteen story structure, was ready for occupancy May 1. Only members of the Jackson County Medical Society and the Kansas City Dental Society will be permitted to occupy offices in the building except for a few selected business firms on the first three floors.

The Missouri State Board of Medical Examiners will have their next meeting for the examination of applicants for license to practice medicine in Missouri on June 11, 12, the meeting to be held at the St. Louis University School of Medicine, St. Louis.

Dr. R. B. H. Gradwohl, of St. Louis, recently was the guest of the El Paso County (Colorado) Medical Society at Colorado Springs.

Dr. James R. Bridges, Kahoka, has been appointed Deputy State Health Commissioner of Clark County for a term of three years.

Dr. Samuel J. Will, Jefferson Barracks, celebrated his fiftieth year in the practice of medicine, March 4.

Dr. Robert Thomas Hill, Columbia, aged 93, has been appointed Chief of Surgeons of the Missouri Confederate Veterans.

Deaths

Dr. Lewis A. Bradbury, Jefferson Barracks, Kansas City, aged 48, died April 26.

Dr. Frank Minor Douglass, Clinton, aged 86, died March 9, of heart disease.

Dr. Frank Standfield Dunham, Kansas City, aged 61, died January 27, of myocarditis and diabetes mellitus.

Dr. Roger William Gay, Ironton, aged 58, died in March.

Dr. Andrew Jackson Hynds, Kirksville, aged 84, died April 18, as the result of an automobile accident.

Dr. John W. Lovan, Hebron, aged 76, died January 25.

Dr. Isaac Newton Miller, Kansas City, aged 72, died March 4, at St. Joseph's Hospital of angina pectoris.

Dr. Joseph M. Painter, Mount Vernon, aged 67, was found dead in his office, March 19.

Dr. Richard Asbery Walker, St. Louis, died March 12, following an operation for carcinoma.

NORTH CAROLINA

The Urological Association of South Carolina held its semi-annual meeting at Columbia, April 14-15.

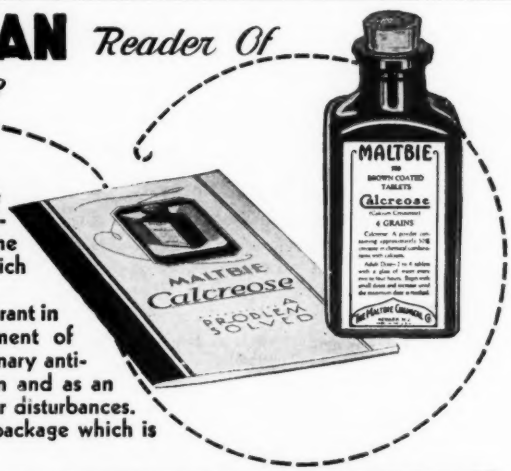
Davis Hospital, Statesville, will soon be enlarged to accommodate fifty additional patients.

Recently ceremonies were held incident to the formal opening of the new fireproof and modernly equipped annex to Park View Hospital at Rocky Mount.

The Forsyth County Tuberculosis Hospital, a $250,000 structure, located near Winston-Salem, was

(Continued on page 42)

EVERY PHYSICIAN *Reader Of*
This Journal Is Welcome
To These



CALCREOSE—calcium creosotate—is a mixture containing in loose chemical combination approximately equal weights of creosote and lime and provides a form of creosote which patients will tolerate.

Calcreose is not only a stimulant expectorant in bronchitis and of value in the treatment of tuberculosis, but is also of value as a urinary antiseptic in frequent and burning urination and as an intestinal antiseptic in enteritis and similar disturbances.

Write us today for the complimentary package which is illustrated above.

CHEMICAL RESEARCHES Fellowship	PHARMACOLOGICAL RESEARCHES Fellowship
Chemical researches on creosote were carried on under the 1928-29 Maltbie Chemical Company Fellowship for Creosote Research in the Chemical Department of Princeton University.	Laboratory tests to establish the relative efficiency of creosote, guaiacol, and other creosote constituents are now under way at the Philadelphia College of Pharmacy and Science.

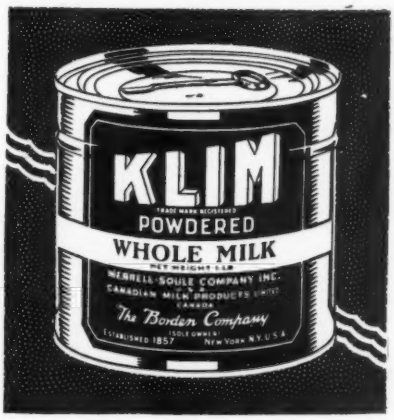
MALTBIE CHEMICAL COMPANY ··· NEWARK, NEW JERSEY

ACCEPTED AMERICAN MEDICAL ASSN

FOR TRAVELING BABIES

KLIM (powdered whole milk) is of indispensable value when babies travel. ¶ Whether incorporated into infant feeding formulae, or used alone as fluid whole milk, Klim has proved its worth. It is simply pure, fresh, full cream milk to which nothing has been added and from which only the water has been removed. ¶ All the vitamins of fluid milk are retained in Klim. The bacterial count is below 3000 per c.c. There are no pathogens. Klim is wholly soluble. Its curd is as fine as that of boiled milk yet it is not boiled milk. Its butter fat is completely homogenized and does not rise. It is frequently tolerated when an allergy to fluid cow's milk exists. ¶ The above characteristics as well as its uniformity and absolute dependability make Klim indispensable for "traveling babies." ¶ *Literature and samples, including infant feeding calculator, will be sent on request.*

Merrell-Soule Co., Inc., 350 Madison Ave., N. Y.



Merrell-Soule Powdered Milk Products, including Klim, Whole Lactic Acid Milk and Protein Milk, are packed to keep indefinitely. Trade packages need no expiration date.

(Recognizing the importance of scientific control, all contact with the laity is predicated on the policy that KLIM and its allied products be used in infant feeding only according to a physician's formula.)

(Continued from page 40)

recently completed. It has facilities for both white and colored patients and a capacity of 182 beds.

Dr. Preston Nowlin, formerly of Lynchburg, Virginia, is now connected with the Nalle Clinic, Charlotte, department of general surgery and urology.

Appointments to the Faculty at Duke University, Durham, which will be opened in the fall, have been announced as follows: Dr. Harold Lindsay Amoss, Associate Professor of Medicine, Johns Hopkins University, as full Professor of Medicine; Dr. Julian D. Hart, Associate Professor of Surgery at Johns Hopkins, as Professor of Surgery; Dr. Wiley Davis Forbus, Associate in Medicine at Johns Hopkins, as Professor of Pathology; William A. Perlzweig, Ph.D., Associate in Medicine at Johns Hopkins, as Professor of Physiologic Chemistry; Francis Huntington Swett, Ph.D., Associate in Anatomy at Vanderbilt University School of Medicine, as Professor of Medicine; Dr. Oscar Carl Edward Hansen, Associate in Medicine at Johns Hopkins, will be associated with the Medical Department; Dr. Christopher G. Johnson, of the Rockefeller Hospital, New York, will also be associated at the Medical School.

Dr. Witt Kluttz, Washington, and Miss Annie Stevens, of York, were married February 15.

Dr. Douglas Hamer, Jr., and Miss Thelma Harbin, of Lenoir, were married April 5.

Deaths

Dr. W. P. Beall, Greensboro, aged 80, was killed instantly March 30, when the automobile in which he was riding was struck by a locomotive.

Dr. Allen W. Dortch, a native of Goldsboro, aged 55, died at his home in Arkansas City, Kansas, March 21.

OKLAHOMA

Adair County Medical Society has elected Dr. E. P. Greene, Westville, President; Dr. E. E. Poyner, Stilwell, Vice-President; Dr. Jos. A. Patton, Stilwell, Secretary-Treasurer.

Cherokee County Medical Society has elected Dr. P. H. Medearis, Tahlequah, President; Dr. Swartz Baines, Tahlequah, Secretary-Treasurer.

Jefferson County Medical Society has elected Dr. J. I. Hollingsworth, Waurika, President; Dr. J. M. McPherson, Terral, Vice-President; Dr. J. I. Derr, Waurika, Secretary-Treasurer.

Kiowa County Medical Society has elected Dr. H. C. Lloyd, Hobart, President; Dr. A. H. Hathaway, Mt. View, Vice-President; Dr. J. H. Moore, Hobart, Secretary.

Kingfisher County Medical Society has elected Dr. Newton Rector, Hennessey, President; Dr. C. M. Hodgson, Secretary.

Leflore County Medical Society has elected Dr. W. L. Shippy, Wister, President; Dr. E. M. Woodson, Poteau, Vice-President; W. F. Lunsford, Poteau, Secretary-Treasurer.

McIntosh County Medical Society has elected Dr. J. H. McColloch, Checotah, President; Dr. F. L. Smith, Eufaula, Vice-President; Dr. W. A. Tolleson, Eufaula, Secretary-Treasurer.

Payne County Medical Society has elected Dr. W. N. Davidson, Cushing, President; Dr. C. E. Sexton, Stillwater, Vice-President; Dr. R. E. Roberts, Stillwater, Secretary-Treasurer.

Pottawatomie County Medical Society has elected Dr. J. E. Hughes, Shawnee, President; Dr. J. I. Gaston, Shawnee, Vice-President; Dr. R. C. Kaylor, McCloud, Second Vice-President; Dr. T. C. Sanders, Shawnee, Third Vice-President; Dr. Wm. M. Gallaher, Shawnee, Secretary-Treasurer.

Seminole County Medical Society has elected Dr. T. H. Hill, Seminole, President; Dr. W. S. Martin, Wewoka, Vice-President; Dr. T. H. Briggs, Wewoka, Secretary-Treasurer.

(Continued on page 44)

A Dependable Agent for Supplying Calcium in Diffusible Form

KALAK WATER presents a saturate solution of calcium as the bicarbonate.

"Of the inorganic salts of calcium, the bicarbonate was the most effective in raising the blood calcium." (W. H. Jansen—Deut. Arch. f. klin Med. Oct. 1924.)

It is not possible to present calcium bicarbonate as a dry powder or as an effervescent mixture to be added to water. This salt can be maintained as the bicarbonate only in an aqueous solution that is charged with carbon dioxide.

KALAK WATER CO.
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WHY DRYCO?

A glass of D R Y C O is free from all pathogenic bacteria and is more effective and less costly than vitamins taken in any other way

BECAUSE:

It Was Perfected:

To meet the demand of both pediatricians and general practitioners for an easily digestible, prepared and modified milk which would be well tolerated by the most delicate infant's stomach!

It Has an Enviable Clinical History:

Thousands of physicians for many years have found DRYCO the best milk for bottle-fed babies. It is stable and unvarying in its constituents; contains the vitamins unimpaired and **is free from all pathogens.**

It Conquered:

The danger of milk-borne infection; the necessity for refrigeration; indigestibility and intolerance in the most difficult feeding cases and the danger of frozen milk troubles-vomiting, loose stools and diarrhea!

Prescribe DRYCO -- The Safe Milk

Let Us Send Clinical Data and Samples of This Milk

Pin this to your Rx blank or letterhead and mail.

THE DRY MILK CO., Inc., 205 E. 42nd St., NEW YORK

(Continued from page 42)

Tulsa County Medical Society has elected Dr. J. Franklin Gorrell, Tulsa, President; Dr. W. A. Dean, Tulsa, Vice-President; Dr. Carl F. Simpson, Secretary-Treasurer.

Washington County Medical Society has elected Dr. W. H. Kingman, Bartlesville, President; Dr. F. S. Etter, Bartlesville, Vice-President; Dr. J. V. Athey, Bartlesville, Secretary; Dr. J. P. Vansant, Dewey, Treasurer.

The Mid-West Hospital Association met in Tulsa, April 25-26. This association consists of hospitals of Missouri, Kansas and Oklahoma now, but invitations have been extended to Arkansas, Texas, Colorado, Iowa and Nebraska to take part in the meeting.

The new municipal hospital at Beaver, costing $50,000, was recently opened.

Dr. L. H. Stuart and Dr. I. A. Nelson, radiologist and pathologist, respectively, at St. John's Hospital, Tulsa, announce the opening of their downtown Clinic.

Dr. C. N. Talley, Marlow, is taking a post-graduate course in Rochester, Minnesota.

Drs. T. J. Lynch and J. O. Lowe, formerly of Okmulgee, are now located at Tulsa.

Dr. A. J. L. Moyse, formerly of Castle, announces his removal to Okemah.

A survey of hospital facilities in the State of Oklahoma will be made by Dr. Bert W. Caldwell, Executive Secretary of the American Hospital Association, Chicago.

Dr. Roger Lockridge Hickman, Clinton, and Miss Nellie C. Shaw, Anadarko, were married April 1.

Deaths

Dr. Robert A. Lively, Durant, aged 82, died February 21, of organic heart disease.

Dr. Jesse James Hoover, Oklahoma City, aged 31, died January 22, at Boulder, Colorado, of tuberculosis.

Dr. Andrew J. Stephenson, Okemah, aged 61, died in March, of myocarditis and dilatation of the heart.

Dr. J. I. Taylor, Ringling, aged 60, died March 2, after a prolonged illness.

SOUTH CAROLINA

Dr. F. H. McLeod, Florence, has been appointed Councilor of the Southern Medical Association from South Carolina, the appointment having been made recently by the President of the Association, Dr. Hugh S. Cumming, Washington, D. C. Dr. McLeod succeeds Dr. William Weston, Columbia, whose term has expired and who having served the maximum time permitted under the Constitution was not eligible for reappointment.

Dr. Kenneth M. Lynch, Medical College of the State of South Carolina, Charleston, was elected President of the State Medical Association at the annual meeting held recently at Florence.

Deaths

Dr. Michael Langford, Blythewood, aged 63, died March 3, of heart disease.

Dr. David Cunningham Scott, Kingstree, aged 80, died in March, of pneumonia.

TENNESSEE

Monroe County Medical Society has elected Dr. P. E. Parker, Sweetwater, President; Dr. W. H. Arrants, Sweetwater, Vice-President; Dr. H. M. Kelso, Madisonville, Secretary-Treasurer.

Robertson County Medical Society has elected Dr. J. W. Thomas, Cross Plains, President; Dr. S. J. Fentress, Goodlettsville, Vice-President; Dr. W. F. Fyke, Springfield, Secretary.

Shelby County Medical Society has elected Dr. J. B. Blue, Memphis, President; Dr. W. E. Williamson, Memphis, Vice-President; Dr. A. F. Cooper, Memphis, Secretary; Dr. T. N. Coppedge, Memphis, Treasurer.

Smith County Medical Society has elected Dr. R. E.

(Continued on page 48)

ORGANOTHERAPY

can be effective only through the use of dependable endocrine products. The reputation and integrity of the manufacturer is the physician's only guarantee of reliability of those organotherapeutic products for which there is no chemical or biological assay. Every manufacturing process of all our products is supervised by our Analytical and Research Department.

DESSICATED PITUITARY BODY, U.S.P.
CORPUS LUTEUM
CORPUS LUTEUM AMPULES
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SOLUTION OF POST-PITUITARY
EPINEPHRIN
EPINEPHRIN AMPULES
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DRIED SUPRARENALS, U.S.P.
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Insure potency and constancy of action by prescribing the products of

G. W. CARNRICK CO.

Manufacturers of Organotherapeutic Products

2-24 Mt. Pleasant Avenue, Newark, New Jersey

S.M.A.

—the pre-proved product

IN 1910, the idea was conceived to adapt the fat of modified milk to that of human milk. In 1913, actual laboratory work was begun to produce a closer adaptation to breast milk than had hitherto been accomplished. The formula was developed in 1914. A preliminary report was made in 1915 and a more extensive and elaborate one appeared in 1918. This was based on practical evidence obtained during an extended feeding observation with 311 cases. This latter report showed conclusively that S. M. A. presented a decided step forward in infant feeding. In November, 1921, S. M. A. was made available to the medical profession.

S. M. A. was, therefore, a pre-proved product, having eight years of experimental research work and six years of clinical observation as a background before being offered to physicians generally as a diet for infants deprived of breast milk. ▲ ▲ We invite you to try S. M. A. in your own infant feeding work and prove to yourself that results are obtained more simply and more quickly with S. M. A.

★ **Pediatrists** see the current number of your Pediatric Journals for complete announcement and information concerning the new **SMACO Service**

Write to our nearest office for samples and our Questions and Answers Booklet No. A-20.

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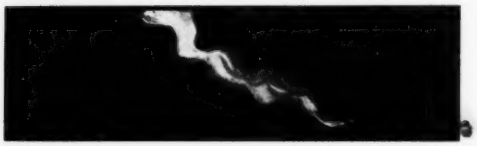


A FOOD WHICH STOPS Intestinal Putrefaction

THE presence of colon poisons from intestinal putrefaction is an abnormal and a serious condition which saps the vitality and is the root cause of a variety of functional disorders.

Fortunately it is possible to prevent the development of putrefactive germs and other poisonous products by changing the intestinal flora.

The perfection of the food product—

Lacto-Dextrin

provides the special carbohydrate combination which affords a rational and effective method of promoting the growth of normal friendly germs in the intestine—the antiputrefactive organisms, B. acidophilus and bifidus.

Sometimes, in obstinate cases, quicker results can be obtained by combining Lacto-Dextrin with Psylla seeds (plantago psyllium). The latter supplies bulk and lubrication and so combats constipation and hastens the passage of Lacto-Dextrin into the colon.

You will find the story of how to use Lacto-Dextrin and Psylla highly interesting as it is told in the book, "The Intestinal Flora." We shall be glad to send you a copy together with clinical trial packages.

The coupon is for your convenience.

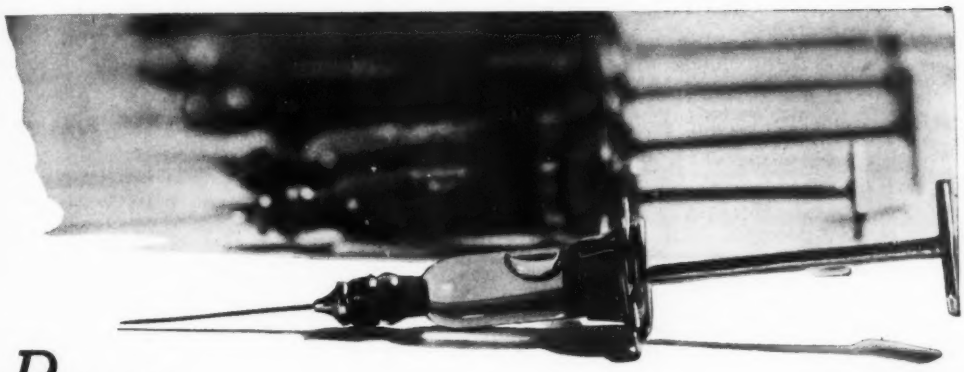
Mail Us This Coupon Today

The
BATTLE CREEK FOOD COMPANY

Dept. SMJ-6, Battle Creek, Michigan

Send me without obligation, trial tins of Lacto-Dextrin and Psylla, also copy of treatise, "The Intestinal Flora."

NAME (Write on margin below.) ADDRESS



Reminders

on the Use of

TETANUS ANTITOXIN

Super-Concentrated

1 This is an antitoxic-globulin of high purity, freed of objectionable proteins, properly aged and processed to yield a clear product in small volume, easily injected and not likely to cause serum-sickness.

2 Prompt administration is urged by all authorities, and larger or repeated doses are advisable in certain types of severe injuries.

3 Continued protection for serum-sensitive patients who eliminate antitoxin rapidly must be provided by giving two, three or even four doses at five to seven-day intervals.

The following dosage forms are offered in syringes ready for prompt use:

1500 Units*	10,000 Units
5000 Units	20,000 Units

*Potency designated as usual in American units.

H. K. MULFORD COMPANY

Manufacturing and Biological Chemists

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(Continued from page 44)

Key, Monoville, President; Dr. W. B. Dalton, Gordonsville, Vice-President; Dr. B. J. High, Elmwood, Secretary.

Tipton County Medical Society has elected Dr. G. B. Gillespie, Covington, President; Dr. J. C. Witherington, Munford, Vice-President; Dr. L. J. Lindsey, Covington, Secretary-Treasurer.

Washington County Medical Society has elected Dr. A. J. Willis, Jonesboro, President; Dr. J. T. McFadden, Johnson City, Vice-President; Dr. C. W. Friberg, Johnson City, Secretary-Treasurer.

White County Medical Society has elected Dr. Isaac Barnes, Bon Air, President; Dr. H. B. Ausbau, Doyle, Vice-President; Dr. S. E. Gaines, Sparta, Secretary.

Williamson County Medical Society has elected Dr. J. B. Core, Allisonia, President; Dr. J. W. Greer, Franklin, Vice-President; Dr. K. S. Howlett, Franklin, Secretary.

Wilson County Medical Society has elected Dr. J. R. Doak, Watertown, President; Dr. Jno. W. Graves, LaGuardo, Vice-President; Dr. J. R. Bone, Lebanon, Secretary-Treasurer.

Tri-County (Benton-Carroll-Henry-Weakley) Medical Society has elected Dr. Geo. McSwain, Paris (Henry County), President; Dr. J. M. Smythe, Camden (Benton County), Vice-President; Dr. Virgil Massey, Huntingdon (Carroll County), Vice-President; Dr. T. W. Fields, Dresden (Weakley County), Vice-President; Dr. R. M. Little, Martin (Weakley County), Secretary.

CLASSIFIED ADVERTISEMENTS

PHYSICIAN WANTED for a rural practice in Northern Virginia, fifty miles from Washington, D. C., in a rich, high, beautiful section with good schools, churches, excellent people and some bad roads. Collections 80 to 95 per cent—excellent territory, with good income. Please give the following information in your first letter: Age, married or single, number of children with ages; where born, where educated, when and where graduated in medicine; internship, if any, when and where; religion of self and wife; membership in fraternities, clubs, lodges, etc.; do you hold a license in Virginia? Address, Box 222, Warrenton, Virginia.

INTERNE WANTED for seventy bed general hospital (charity). Salary $50.00 and full maintenance. Address Miss Regina H. Kaplan, Superintendent, Leo N. Levi Memorial Hospital, Hot Springs, Ark.

CHILDREN WANTED—Few younger children for excellent boarding school in Northern Virginia, near Washington, D. C. Girls not over twelve years old. Boys not over eight years old. Enroll now for session beginning September, 1930. Kindergarten. Regular courses, French, dancing, music. Apply to Dr. M. B. Hiden, P. O. Box 222, Warrenton, Va.

LABORATORY AND X-RAY TECHNICIANS—I have several highly trained combined laboratory and x-ray technicians and office assistants available for positions in hospitals, clinics, surgeons' and physicians' offices, state and municipal laboratories. Dr. L. H. South, Laboratory Service Bureau, Kentucky State Board of Health, Louisville, Ky.

TECHNICIANS are in demand. We are successfully training laboratory and x-ray workers. Send us your assistant and we will return you a competent technician. If you are in immediate need of a well-trained helper, write or phone. Full information upon request. Alabama Pathological Laboratory, Birmingham General Hospital, Birmingham, Ala.

DRUG AND ALCOHOLIC PATIENTS are humanely and successfully treated in Glenwood Park Sanitarium, Greensboro, N. C.; reprints of articles mailed upon request. Address W. C. Ashworth, M.D., Owner, Greensboro, N. C.

The National Tuberculosis Association held its twenty-sixth annual meeting in Memphis, May 7-10.

Dr. John C. Burch, Nashville, has been elected President of the Southern Society of Clinical Surgeons.

Dr. C. M. Sebastian, of Martin, recently celebrated his eightieth birthday. He has been practicing sixty-two years.

Governor Horton has named the following as members of the Tuberculosis Hospital Commission: East Tennessee—Dr. Herbert Acuff, Knoxville; Middle Tennessee—Dr. K. S. Howlette, Franklin; West Tennessee—Dr. L. M. Graves, Memphis.

Dr. Dexter L. Woods, of Murfreesboro, is now located at Waynesboro.

Dr. C. B. A. Turner, Union City, had to resign as head of the Obion County Health Unit on account of ill health.

The Polyclinic, Memphis, announces the association of Dr. Ralph Bowen as pediatrician.

Deaths

Dr. William James Engles, Smyrna, aged 66, died March 22, of heart disease.

Dr. Charles T. Hibbett, Nashville, aged 78, died March 14, of cerebral hemorrhage.

Dr. Thomas Harkins Ingram, Memphis, aged 47, died March 9, at Legion, Texas.

Dr. John Nathaniel Koffman, Humboldt, aged 78, died February 26, of pneumonia.

Dr. Joseph Ward Russell, Nashville, aged 42, died March 16, of cerebral hemorrhage and chronic nephritis.

Dr. James G. Thomison, Dayton, aged 77, died March 4.

Dr. J. L. Thompson, Victoria, died January 31, of carcinoma of the face.

TEXAS

Dr. Elbert Dunlap, Dallas, has been appointed Councilor of the Southern Medical Association from Texas, the appointment having been made recently by the President of the Association, Dr. Hugh S. Cumming, Washington, D. C. Dr. Dunlap succeeds Dr. H. Leslie Moore, Dallas, whose term had expired and who having served the maximum time permitted under the Constitution was not eligible for reappointment.

Ector-Midland-Martin-Howard Counties Medical Society has elected Dr. W. E. Ryan, Midland, President; Dr. M. H. Bennett, Big Springs, Vice-President; Dr. J. R. Barcus, Big Springs, Secretary-Treasurer.

Jefferson County Medical Society has elected Dr. B. H. Baughn, Port Arthur, President; Dr. George Sladczyk, Port Arthur, Vice-President; Dr. L. C. Heare, Port Arthur, Secretary-Treasurer.

Lamar County Medical Society has elected Dr. M. A. Walker, Paris, President; Dr. W. W. Fitzpatrick, Paris, Vice-President; Dr. Scott Hammond, Paris, Secretary-Treasurer, reelected.

Lubbock-Crosby Counties Medical Society has elected Dr. J. T. Krueger, Lubbock, President; Dr. G. G. Castleberry, Lubbock, Vice-President; Dr. R. L. Powers, Lubbock, Secretary-Treasurer.

McLennan County Medical Society has elected Dr. I. Warner Jenkins, Waco, President; Dr. E. L. Wedemeyer, Waco, Vice-President; Dr. C. E. Rayburn, Waco, Secretary-Treasurer.

Milam County Medical Society has elected Dr. Wm. J. Fontaine, Jones Prairie, President; Dr. D. E. Monroe, Cameron, Vice-President; Dr. G. B. Taylor, Cameron, Secretary-Treasurer.

The twenty-fifth annual meeting of the Tri-State Medical Society (Arkansas-Louisiana-Texas) was held at Marshall, March 20-21.

Dr. William R. Fickessen has been appointed Medical Director and Superintendent of the Kerrville Sanatorium, Kerrville.

Dr. William W. Britton is Medical Director of the Southern Baptist Sanatorium at El Paso, succeeding Dr. Jesse D. Riley, who has been elected Superintendent of the Arkansas State Sanatorium at Booneville.

Mr. H. D. Shook, previously at Jackson Memorial Hospital, Miami, Florida, and at St. Luke's Hospital,

(Continued on page 50)

Patient Types . . .

The Child

NEVER too young to learn the golden rule of "Habit Time". Much too young to learn the cathartic habit.

When irregularities of diet or neglect cause constipation, Petrolagar assists the necessary regimen of bowel education. Children like the taste — it's just like pudding sauce.

Petrolagar is composed of 65% (by volume) mineral oil with the indigestible emulsifying agent agar-agar.

Petrolagar

Petrolagar Laboratories, Inc.,
536 Lake Shore Drive, S.O. 6
Chicago, Ill.

Gentlemen: — Send me copy of "Habit Time" (of bowel movement) and specimens of Petrolagar.

Dr.....

Address.....

.....

(Continued from page 48)

Duluth, Minnesota, has been appointed Superintendent of the El Paso Masonic Hospital at El Paso.

A new hospital ward for tuberculous patients, costing $40,000, was recently added to the Wichita Falls State Hospital, Wichita Falls, which has a capacity of forty patients.

Deaths

Dr. Jesse Carroll Bennett, Grapevine, aged 51, died March 9, at Fort Worth, of hypertension.

Dr. Henry H. Compton, Allen, aged 81, died March 23, of pulmonary edema.

Dr. John L. Rains, Ennis, aged 68, died February 16, of arteriosclerosis and cerebral thrombosis.

Dr. Charles Francis Randall, Amarillo, aged 66, died March 31.

Dr. John B. Smith, Crockett, aged 83, died February 8, of valvular heart disease.

Dr. William Stanton Winter, Jr., Port Arthur, aged 43, died March 3, of acute dilatation of the heart.

VIRGINIA

Alleghany-Bath County Medical Society has elected Dr. Courtney Edmond, Clifton Forge, President; Dr. B. B. McCutchan, Clifton Forge, Secretary; Dr. W. M. Revercomb, Clifton Forge, Treasurer.

Wise County Medical Society has elected Dr. S. P. Gardner, Derby, President; Dr. W. R. Culbertson, Norton, Secretary, reelected.

The Southwestern Virginia Medical Society held its regular semi-annual meeting in Radford, March 24-25.

A joint meeting of the Southside Virginia Medical Association, Dr. J. A. Grizzard, President, and the staff of the Central State Hospital for the colored mentally sick and defectives, was held March 11. On this occasion the opening of the new medical building was featured.

Plans are being made for a new hospital for William and Mary College, Williamsburg, this to be erected on the college campus.

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Stuart Circle Hospital, Richmond, will soon erect a three-story nurses' home.

The Richmond Academy of Medicine, cooperating with the Department of Clinical Education of the State Medical Society, held a graduate clinic for physicians of Virginia, on April 22. The guest speakers were Dr. O. H. Perry Pepper, Professor of Clinical Medicine, University of Pennsylvania School of Medicine, Philadelphia, and Dr. Harold L. Amoss, Professor of Medicine at Duke University School of Medicine, Durham, North Carolina.

Delegates from the Medical Society of Virginia to the U. S. Pharmacopoeial Convention of the United States, which met in Washington, D. C., May 13, were Dr. Alex. G. Brown, Jr., Richmond; Dr. J. C. Flippin, University; and Dr. P. W. Boyd, Winchester.

At a recent meeting of the Albermarle Chapter of the Izaak Walton League of America, Dr. H. S. Hedges, Charlottesville, was elected Honorary President, and Dr. Fletcher D. Woodward, University, one of the Directors.

Dr. Guy R. Fisher, Staunton, has been elected President of the Shrine Club of that City.

Dr. and Mrs. C. A. Broadus, of Dahlgren, left for China the latter part of March, where Dr. Broadus will be stationed for two years.

Dr. Manford Call, who has been Dean of the Medical College of Virginia at Richmond since 1922, resigned but is continuing his services in the Department of Medicine as Professor of Clinical Medicine. Dr. Lee E. Sutton, Jr., Richmond, is the Acting Dean.

Dr. John Russell Gill, Jr., formerly a member of the medical staff of the East Louisiana State Hospital at Jackson, Louisiana, has been elected to the staff of the Central State Hospital, Petersburg.

Dr. L. H. Bracey, after internships at a State Hospital in Pennsylvania and the Johnston-Willis Hospital in Richmond, is now practicing in his native county, Mecklenburg, at South Hill.

A vacancy at the Virginia Military Institute, caused by the death of Dr. R. Bruce James, Post Surgeon, has been filled by Dr. Reid White, Jr., of Lexington.

Dr. J. M. Emmett, Clifton Forge, has been appointed as Councilor for the Tenth District, succeeding Dr. J. F. Fulton, who recently tendered his resignation.

Dr. Charles Hanson Peterson, Roanoke, and Miss Cornelia Brocking, Charleston, West Virginia, were married March 13.

Deaths

Dr. John Rice Anderson, Martinsville, aged 71, died in Roanoke, March 11, after a long illness.

Dr. George H. Chewning, Fredericksburg, aged 83, died March 20, of senility.

Dr. John Maynard Harwood, Petersburg, aged 40, died February 12, of cardiorenal disease.

Dr. James Thornton Neel, Gratton, aged 41, died January 28, of tuberculous meningitis.

Dr. John Garnett Nelson, Richmond, aged 58, died March 30.

Dr. Spurgeon John Railey, Handsom, aged 46, died March 26.

Dr. Charles Eugene Rogers, Covington, aged 65, died February 11, in Chicago, of pulmonary edema following myocarditis.

Dr. Walter Stith Phillips, Rapidan, aged 60, was found dead in bed, March 5, of heart disease.

Dr. Julian F. Ward, Winchester, aged 79, died April 1, following several weeks' illness.

WEST VIRGINIA

The West Virginia Tuberculosis and Health Association will hold its ninth annual meeting in Huntington, June 5 and 6, under the auspices of the Huntington Tuberculosis Association, Cabell County Medical Society and the Chamber of Commerce. Dr. Walter E. Vest is Chairman of the Program Committee.

Deaths

Dr. Richard T. Davis, former Health Commissioner of West Virginia, aged 57, died recently at Warsaw, Virginia.

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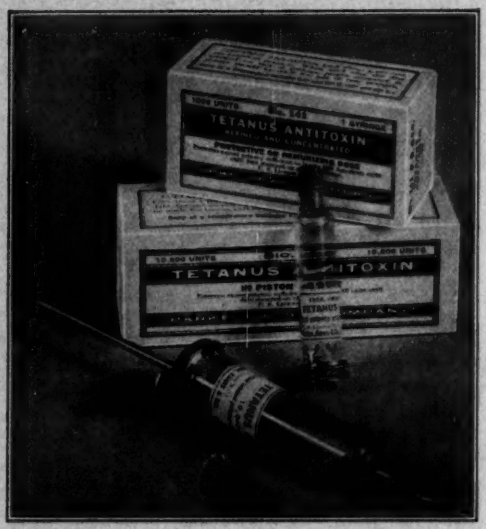

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